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Formule per il calcolo numerico degli integrali coulombiani con orbitali, di tipo *s, p, d* ed *f*, con *n* intero e non intero (*). Nota II.

Gli integrali coulombiani sono indubbiamente i più importanti fra gli integrali d'interazione elettronica bicentrici: sia in quanto numericamente più grandi rispetto a quelli ibridi e di scambio, sia perchè sussistono teorie, come quella di Pariser e Parr, basate essenzialmente sulla sola conoscenza di questi integrali.

Essi hanno perciò costituito argomento di studio da parte di numerosi Ricercatori [1].

La conoscenza di questi integrali rappresenta senza dubbio una prima tappa per l'ulteriore sviluppo di un moderno calcolo della struttura elettronica molecolare.

I tipi di integrali coulombiani studiati dai precedenti Autori si riferiscono essenzialmente alle funzioni atomiche di Slater relative ad orbitali di tipo *s*, *p*, e, in qualche caso più raro, anche ad orbitali di tipo *d*, sempre però caratterizzati da numero quantico *n* intero. Mediante questi integrali già noti si possono studiare, in prima approssimazione, le molecole formate da atomi del primo e secondo periodo, nelle quali le funzioni d'onda di Slater, con *n* intero, costituiscono approssimazioni abbastanza buone dei migliori orbitali atomici numerici di Hartree. Nel caso invece di atomi a più alto numero atomico, questa approssimazione diventa sempre meno soddisfacente, ed è necessario perciò ricorrere, nell'approssimazione di *n* intero, a combinazioni lineari di più funzioni d'onda, con evidente complicazione dei calcoli e perdita di significato fisico dell'orbitale usato. Ci è sembrato pertanto utile impostare il calcolo degli integrali bicentrici coulombiani relativi a funzioni di Slater, caratterizzate da qualsiasi valore di *n*, intero e non intero.

Abbiamo inoltre esteso i calcoli fino agli orbitali «*f*».

Questa generalizzazione sui valori di *n*, necessaria come già si è detto per gli orbitali degli atomi più pesanti, è stata da noi estesa anche al caso di quelli più leg-

(*) Memoria presentata dall'Accademico Giovanni Battista Bonino.

geri, dove, pur essendo meno necessaria, può portare tuttavia ad un miglioramento dei rusltati.

Dal punto di vista del calcolo, la considerazione di numeri n non interi presenta notevoli difficoltà: mentre infatti con n interi è possibile uno sviluppo analitico dei calcoli (sia pure servendosi dello sviluppo in serie di $1/r_{12}$), un analogo sviluppo analitico completo non è ulteriormente applicabile al caso di orbitali con n non intero.

Come già notato in un precedente lavoro ([2]) è stato perciò necessario impostare il problema secondo i metodi del calcolo numerico. Questa ultima via è resa possibile mediante l'uso dei moderni calcolatori elettronici.

Il problema più grave che si è presentato è stato quello di scegliere una opportuna suddivisione dei campi di integrazione: può infatti capitare che i calcoli comportino differenze fra numeri che diventano sempre più grandi, in modo che la precisione va quasi completamente persa, fino ad ottenere risultati privi di significato.

Questa difficoltà generalmente si elimina, o impostando i calcoli in doppia precisione con un assai grande aumento dei tempi di calcolo, o meglio, con un più opportuno studio dei campi e delle variabili di integrazione.

In questo lavoro abbiamo essenzialmente studiato il problema dal secondo punto di vista, sviluppando i calcoli, analiticamente, campo per campo, per quanto possibile, in modo da giungere a formule adatte al calcolo numerico, senza dover ricorrere al metodo della doppia precisione.

Il criterio adottato nella suddivisione dei campi di integrazione è basato sull'analisi del comportamento della funzione integranda, in modo ch'essa abbia uno stesso andamento nello stesso campo.

Le funzioni di base scelte sono le funzioni reali del tipo di Slater date da:

$$\sigma^{n,l,m} = \left[\frac{(2\,\zeta)^{2n+1}}{(2\,n)\,!}\right]^{1/2} r^{\,n-1}\, e^{-\zeta r}\, S_{l,m}\,(\vartheta,\varphi) \qquad (1)$$

dove

$$\left\{\begin{aligned} S_{l,0} &= Y_l^0 \\ S_{l,|m|} &= \frac{1}{\sqrt{2}}\left(Y_l^{-|m|} + Y_l^{|m|}\right) \\ S_{l,-|m|} &= \frac{i}{\sqrt{2}}\left(Y_l^{-|m|} - Y_l^{|m|}\right) \end{aligned}\right. \qquad (2)$$

n è un numero qualsiasi positivo, ζ è la carica efficace, caratteristica dell'atomo e dell'orbitale, mentre le Y_l^m sono le funzioni armoniche sferiche definite da:

$$Y_l^m = \sqrt{\frac{2\,l+1}{4\,\pi}\,\frac{(l-|m|)\,!}{(l+|m|)\,!}}\ \mathrm{sen}^{|m|}\,\vartheta\, P_l^{|m|}\,(\cos\vartheta)\, e^{im\varphi} \qquad (3)$$

dove $P_l^{|m|}$ indica il polinomio associato di LEGENDRE di grado l e ordine $|m|$.

Gli orbitali con $l = 0, 1, 2, 3$ sono stati indicati, come nella annotazione corrente, con lettere s, p, d, f, seguite da un indice che è lo stesso (in m) della $S_{l,\pm|m|}$.

Questa notazione è stata ritenuta più comoda soprattutto per gli orbitali f, di quella che usa le lettere x, y, z. Il confronto fra le due notazioni è riportato per comodità nella teballa seguente:

$s = s$	$S_{0,0}$
$p_0 = p_z$	$S_{1,0}$
$p_1 = p_x$	$S_{1,1}$
$p_{-1} = p_y$	$S_{1,-1}$
$d_0 = d_{z^2}$	$S_{2,0}$
$d_1 = d_{xz}$	$S_{2,1}$
$d_{-1} = d_{yz}$	$S_{2,-1}$
$d_2 = d_{x^2-y^2}$	$S_{2,2}$
$d_{-2} = d_{xy}$	$S_{2,-2}$
$f_0 = f_{(5z^2-3r)}$	$S_{3,0}$
$f_1 = f_{x(5z^2-1)}$	$S_{3,1}$
$f_{-1} = f_{y(5z^2-1)}$	$S_{3,-1}$
$f_2 = f_{z(x^2-y^2)}$	$S_{3,2}$
$f_{-2} = f_{xyz}$	$S_{3,-2}$
$f_3 = f_{x(x^2-3y^2)}$	$S_{3,3}$
$f_{-3} = f_{y(y^2-3x^2)}$	$S_{3,-3}$

Gli assi di riferimento sono stati orientati come in fig. 1.

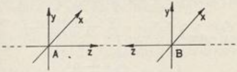

Fig. 1

Un generico integrale coulombiano, costruito con 4 funzioni del tipo (1) è caratterizzato da 4 gruppi di indici, n_1, l_1, m_1; n_2, l_2, m_2; n_3, l_3, m_3; n_4, l_4, m_4; e può scriversi:

$$I = \int \omega_a(1) \frac{1}{r_{12}} \omega_b(2)\, d\tau_1\, d\tau_2 \tag{4}$$

dove gli indici a e b indicano i due centri rispetto ai quali sono riferiti gli orbitali, i numeri 1 e 2 stanno rispettivamente per le tre coordinate dei due elettroni. Le due distribuzioni di carica ω_a ed ω_b, esplicitate, sono:

$$\omega_a(1) = \left[\frac{(2\,\zeta_1)^{n_1}\,(2\,\zeta_2)^{n_2}}{(2\,n_1)!\,(2\,n_2)!}\right]^{1/2} r_a^{(n_1+n_2-2)}\, e^{-(\zeta_1+\zeta_2)\,r_a}\, S_{l_1,m_1}(\vartheta_{1a},\varphi_1)\, S_{l_2,m_2}(\vartheta_{1a},\varphi_1)$$

$$\omega_b(2) = \left[\frac{(2\,\zeta_3)^{n_3}\,(2\,\zeta_4)^{n_4}}{(2\,n_3)!\,(2\,n_4)!}\right]^{1/2} r_b^{(n_3+n_4-2)}\, e^{-(\zeta_3+\zeta_4)\,r_b}\, S_{l_3,m_3}(\vartheta_{2b},\varphi_2)\, S_{l_4,m_4}(\vartheta_{2b},\varphi_2) \tag{5}$$

in ciascuna di queste due distribuzioni la parte angolare è data dal prodotto di due funzioni $S_{l,m}$ del tipo (2), e può essere sempre espressa come una combinazione lineare delle stesse funzioni. Per trovare tali combinazioni possiamo partire dalla (2) e sfruttare la formula

$$Y_{l_1}^{m_1}\, Y_{l_2}^{m_2} = \sum_L \left[\frac{(2\,l_1+1)\,(2\,l_2+1)}{4\,\pi\,(2\,L+1)}\right]^{1/2} C\,(l_1\,l_2\,L\,;\,0\,0)\; C\,(l_1\,l_2\,L\,;\,m_1\,m_2)\; Y_L^{m_1+m_2} \qquad (6)$$

I coefficienti $C\,(l_1\,l_2\,L\,;\,00)$ e $C\,(l_1\,l_2\,L\,;\,m_1\,m_2)$ sono i coefficienti di WIGNER (3). $l_1\,l_2$ e L devono soddisfare la condizione triangolare $\Delta\,(l_1\,l_2\,L)$ e la regola di parità $l_1 + l_2 + L =$ numero pari.

L'espressione analitica dei coefficienti di WIGNER (vedasi ad es. il riferimento bibliografico 4) è la seguente

$$C\,(l_1\,l_2\,L\,;\,m_1\,m_2) = (-1)^{l_2+m_2}\,\cdot$$

$$\cdot\left[\frac{(L+l_1-l_2)\,!\,(l_1+l_2-L)\,!\,(L-m)\,!\,(l_1-m_1)\,!\,(2\,L+1)}{(L-l_1+l_2)\,!\,(l_1+l_2+L+1)\,!\,(L+m)\,!\,(l_1+m_1)\,!\,(l_2-m_2)\,!\,(l_2+m_2)\,!}\right]^{1/2}\cdot$$

$$\cdot\,\frac{(L+l_2+m_1)\,!}{(l_1-l_2-m)\,!}\;{}_3F_2\,(-L+l_1-l_2,\, l_1-m_1+1,\, -L-m\,;\, l_1-l_2-m+1,\, -$$

$$-L-l_2-m\,;\,1) \qquad (7)$$

dove ${}_3F_2\,(a_1, a_2, a_3\,;\; b_1, b_2\,;\; z)$ è la serie ipergeometrica definita da:

$${}_3F_2\,(a_1, a_2, a_3\,;\, b_1, b_2\,;\, z) = \sum_{\nu=0}^{\infty} \frac{a_1\,(\nu)\,a_2\,(\nu)\,a_3\,(\nu)}{b_1\,(\nu)\,b_2\,(\nu)}\,\frac{z^\nu}{\nu\,!} \qquad (8)$$

con

$$\left\{\begin{aligned} a_n\,(\nu) &= \frac{(a_n+\nu-1)\,!}{(a_n-1)\,!} \\ b_n\,(\nu) &= \frac{(b_n+\nu-1)\,!}{(b_n-1)\,!} \end{aligned}\right. \qquad (9)$$

Poiché, come risulta dalla (7), almeno uno degli a è un intero negativo la serie (8) si riduce sempre a un polinomio.

Nel caso particolare di $m_1 = m_2 = 0$ la (7) assume la espressione:

$$C\,(l_1\,l_2\,L\,;\,0\,0) = (-1)^{\frac{l_1+l_2+L}{2}} \left[\frac{2\,L+1}{l_1+l_2+L+1}\right]^{1/2}\cdot$$

$$\cdot\,\frac{\tau\,(l_1+l_2+L)}{\tau\,(l_1+l_2-L)\,\tau\,(l_1-l_2+L)\,\tau\,(-l_1+l_2+L)} \qquad (10)$$

dove

$$\tau\,(x) = \frac{\left(\dfrac{x}{2}\right)!}{\sqrt{x\,!}} \qquad (11)$$

Il calcolo dei coefficienti di WIGNER è alquanto laborioso.

Alcuni autori ([4]) hanno sviluppato le formule nei casi particolari in cui uno dei due indici l_1, l_2 valga 0, 1, 2. Noi non abbiamo trovato sviluppi per valori di l_1 o l_2 superiori a 2, necessari al fine di poter prendere in considerazione gli orbitali f. Abbiamo perciò sviluppato i relativi calcoli ed i risultati sono riportati nella successiva tabella I. Nella tabella II è riportato l'analogo sviluppo relativo alle funzioni $S_{L,m}$.

Sostituendo i risultati della tabella II nelle (5) le due distribuzioni di carica diventano:

$$\omega_a(1) = N\left[\frac{(2\zeta_1)^{n_1}(2\zeta_2)^{n_2}}{(2n_1)!\,(2n_2)!}\right]^{1/2} r_a^{(n_1+n_2-2)}\cdot e^{-(\zeta_1+\zeta_2)r_a}\sum_{L,M}\gamma_{L,M}S_{L,M}(\vartheta_{1a},\varphi_1)$$

$$\omega_b(2) = N\left[\frac{(2\zeta_3)^{n_3}(2\zeta_4)^{n_4}}{(2n_3)!\,(2n_4)!}\right]^{1/2} r_b^{(n_3+n_4-2)}\cdot e^{-(\zeta_3+\zeta_4)r_b}\sum_{L,M}\gamma_{L,M}S_{L,M}(\vartheta_{2b},\varphi_2) \qquad (12)$$

Le (12) mostrano come ciascuna delle due distribuzioni si scinda nella somma di distribuzioni elementari caratterizzate da una parte angolare semplice del tipo $S_{L,M}(\vartheta,\varphi)$.

Poiché le funzioni $S_{L,M}$ si comportano come le rappresentazioni irriducibili del gruppo $C_{\infty,v}$, nell'integrale (4) rimangono soltanto quei termini che corrispondono ad uguali valori di M nelle due distribuzioni (12).

Avremo cioè:

$$I = \int\omega_a(1)\frac{1}{r_{12}}\omega_b(2)\,d\tau_1\,d\tau_2 = \left[\frac{(2\zeta_1)^{n_1}(2\zeta_2)^{n_2}(2\zeta_3)^{n_3}(2\zeta_4)^{n_4}}{(2n_1)!\,(2n_2)!\,(2n_3)!\,(2n_4)!}\right]^{1/2}\cdot$$

$$\cdot\sum_{l,m}N\gamma_{l,m}\sum_{l',m'}N\gamma_{l',m'}\cdot\int r_a^{(n_1+n_2-2)}r_b^{(n_3+n_4-2)}\cdot$$

$$\cdot e^{-(\zeta_1+\zeta_2)r_a-(\zeta_3+\zeta_4)r_b}\cdot\frac{1}{r_{12}}S_{l,m}(\vartheta_{1a},\varphi_1)\cdot S_{l',m'}(\vartheta_{2b},\varphi_2)\,d\tau_1,d\tau_2 =$$

$$=\left[\frac{(2\zeta_1)^{n_1}(2\zeta_2)^{n_2}(2\zeta_3)^{n_3}(2\zeta_4)^{n_4}}{(2n_1)!\,(2n_2)!\,(2n_3)!\,(2n_4)!}\right]^{1/2}\sum_{l,l',M}N^2\gamma_{l,M}\gamma_{l',M}\cdot$$

$$\cdot\int r_a^{(n_1+n_2-2)}r_b^{(n_3+n_4-2)}e^{(-Z_1)r_a-Z_2r_b}\frac{1}{r_{12}}\cdot S_{l,M}(1)\,S_{l',M}(2)\,d\tau = \qquad (13)$$

$$= C_{n_1n_2n_3n_4}\sum_{l,l',M}\gamma_{l,M}\gamma_{l',M}\,J(l,l',M)$$

dove $C_{n_1n_2n_3n_4}$ è il prodotto dei coefficienti di normalizzazione dei singoli orbitali; $\gamma_{l,M}$, $\gamma_{l',M}$ sono i coefficienti che compaiono nella tabella II di decomposizione dei prodotti di orbitali, mentre $i\,(l, l', M)$ è un integrale elementare definito da:

$$J(l,l',M) = \frac{1}{2\pi}\int r_a^{N_1-2}r_b^{N_2-2}e^{-Z_1r_a-Z_2r_b}\cdot S_{l,M}(1)\,S_{l',M}(2)\frac{1}{r_{12}}\,d\tau_1\,d\tau_2 \qquad (14)$$

con

$$N_1 = n_1+n_2;\; N_2 = n_3+n_4;\; Z_1 = \zeta_1+\zeta_2;\; Z_2 = \zeta_3+\zeta_4 \qquad (15)$$

poiché $S_{l,-M}$ indica la stessa funzione di $S_{l,M}$ ruotata nello spazio, deriva che:

$$i\,(l, l', M) = i\,(l, l', -M) \tag{16}$$

Potremo perciò considerare soltanto quei valori di M tali che $M \geqslant 0$.

Passiamo ora a discutere il calcolo di un integrale elementare del tipo (14). A tal fine consideriamo lo sviluppo di Legendre di $\frac{1}{r_{12}}$ (v. fig. 2), che nelle $S_{l,M}$ risulta:

$$\frac{1}{r_{12}} = \sum_{L=0}^{\infty} \sum_{m=-L}^{L} \frac{4\pi}{2L+1} \frac{r_<^L}{r_>^{L+1}} S_{L,m}(\vartheta_{a_1}, \varphi_1) \cdot S_{L,m}(\vartheta_{a_2}, \varphi_2) \tag{17}$$

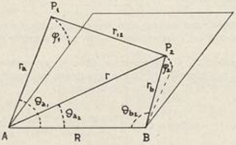

Fig. 2

Sostituendo la (17) nella (14), integrando rispetto alle variabili angolari dell'elettrone 1, e tenuto conto che le $S_{l,M}$ sono funzioni ortonormali, si ottiene:

$$J\,(l, l', M) = \frac{2}{2l+1} \int r_a^{N_1} r_b^{N_2-2} e^{-Z_1 r_a - Z_2 r_b} S_{l,M}(\vartheta_{a_2}, \varphi_2) \cdot$$

$$\cdot S_{l',M}(\vartheta_{b_2}, \varphi_2) \frac{r_<^l}{r_>^{l+1}} \, d\,r_a \, d\,\tau_2 \tag{18}$$

Operando il seguente cambiamento di variabili:

$$\begin{array}{ll} r_a = R\,u & 0 < u < \infty \\ r_b = R\,v & 0 < v < \infty \\ \cos \vartheta_{b_2} = t & -1 < t < 1 \\ r = R\,q & q = \sqrt{1 + v^2 - 2\,v\,t} \\ \cos \vartheta_{a_2} = \xi & \xi = \dfrac{1 - v\,t}{q} \end{array} \tag{19}$$

sostituendo nella (18) ed integrando in φ_2, si ottiene:

$$J = (l, l', M) = \frac{2\, R^{N_1 + N_2 + 1}}{2\, l + 1} \int u^{N_1}\, v^{N_2} \cdot e^{-Z_1 R u - Z_2 R v}\, \mathcal{P}_l^M (\xi)\, \mathcal{P}_{l'}^M (t) \cdot$$

$$\cdot \left\{ \begin{matrix} \dfrac{u^l}{q^{l+1}} \\ \dfrac{q^l}{u^{l+1}} \end{matrix} \right\} d\,u\; d\,v\; d\,t = \tag{20}$$

$$= R^{N_1 + {}_2N + 1} \int u^{N_1}\, v^{N_2}\, e^{-Z_1 R u - Z_2 R v}\, F_{l,l',M} (u, v)\, d\,u\, d\,v$$

dove abbiamo posto:

$$F_{l,l',M} (u, v) = \frac{2}{2\,l + 1} \int_{-1}^{1} \mathcal{P}_l^M (\xi)\, \mathcal{P}_{l'}^M (t) \cdot$$

$$\left\{ \begin{matrix} \dfrac{u^l}{q^{l+1}} \\ \dfrac{q^l}{u^{l+1}} \end{matrix} \right\} d\,t \tag{21}$$

Nella (21) deve essere preso il termine superiore della $\}\ \{$ per $u < q$; il termine inferiore per $q < u$.

Per il calcolo della (21) conviene suddividere il campo di variabilità delle u e v in quattro parti, come indicato in Fig. 3.

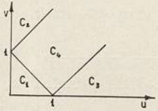

Fig. 3

In C_1 troviamo:

$$F_{l,l' M} (u, v) = \alpha\, (l, l', M)\, u^l\, v^{l'} \tag{22}$$

in C_2:

$$\begin{cases} F_{l,l',M} (u, v) = \beta\, (l, l', M)\, \dfrac{u^l}{v^{l'+1}}\, (l \leqslant l') \\ F_{l,l',M} (u, v) = 0 \qquad (l > l') \end{cases} \tag{23}$$

in C_3:

$$\begin{cases} F_{l,l',M} (u, v) = 0 \qquad (l < l') \\ F_{l,l',M} (u, v) = \beta\, (l', l, M)\, \dfrac{v^{l'}}{u^{l+1}}\, (l \geqslant l') \end{cases} \tag{24}$$

L'espressione della $F(u, v)$ in C_4 è più complicata in quanto la funzione integranda cambia di forma nell'intervallo di integrazione. Si ha infatti:

$$F(u, v) = \frac{2}{2l+1} \left\{ u^l \int_{-1}^{\frac{1+v^2-u^2}{2v}} \frac{\mathcal{P}_l^M(\xi)\,\mathcal{P}_l^M(t)}{q^{l+1}}\,dt + \frac{1}{u^{l+1}} \cdot \right.$$

$$\left. \cdot \int_{\frac{1+v^2-u^2}{2v}}^{1} \mathcal{P}_l^M(\xi)\,\mathcal{P}_l^M(t)\,q^l\,\mathrm{dt} \right\} \tag{25}$$

Prendendo q come variabile indipendente la (25) si scrive

$$F(u, v) = \frac{2}{(2l+1)\,u^{l+1}\,v} \left\{ u^{2l+1} \int_{u}^{1+v} \frac{\mathcal{P}_l^M(\xi)\,\mathcal{P}_{l'}^M(t)}{q^l}\,dq + \right.$$

$$\left. + \int_{1-v}^{u} \mathcal{P}_l^M(\xi)\,\mathcal{P}_{l'}^M(t)\,q^{l+1}\,dq \right\} \tag{26}$$

Nell'estremo inferiore del secondo integrale abbiamo posto $1 - v$ anziché $|1 - v|$ perché l'integrale indefinito è sempre un polinomio in q^2.

Tenendo conto della relazione:

$$q\,(1 - \xi^2)^{1/2} = v\,(1 - t^2)^{1/2}$$

la (26) diventa

$$F(u, v) = \frac{C_{l\,M} \cdot C_{l'\,M}}{(2l+1)\,u^{l+1}\,2^{2M-1}\,v^{M+1}} \left\{ u^{2l+1} \int_{u}^{1+v} \Big[-(1-v^2)^2 + \right.$$

$$+ 2\,(1+v^2)\,q^2 - q^4 \Big]^M \frac{1}{q^{L+M}}\, R_l^M\left(\frac{1-v^2+q^2}{2q}\right) R_{l'}^M\left(\frac{1+v^2-q^2}{2v}\right) dq +$$

$$+ \int_{1-v}^{u} \Big[-(1-v^2)^2 + 2\,(1+v^2)\,q^2 - q^4 \Big]^M R_l^M\left(\frac{1-v^2+q^2}{2q}\right) R_{l'}^M \cdot$$

$$\left. \cdot \left(\frac{1+v^2-q^2}{2v}\right) q^{L-M+1}\,dq \right\} \tag{27}$$

dove $C_{l,M}$, $C_{l',M}$ sono i coefficienti di normalizzazione dei polinomi associati di Legendre, mentre $R_\alpha^M(x)$ è il polinomio di grado $\alpha - M$ definito da:

$$R_\alpha^M(x) = (1 - x^2)^{-\frac{M}{2}}\,P_\alpha^M(x)$$

Lo sviluppo della (27) conduce ad una espressione polinomiale in u, $1 + v$, $1 - v$, alquanto complicata.

Nel caso di l, $l' = 0$, 1 si ottiene:

l	l'	M	
0	0	0	$F(u, v) = \frac{1}{uv} [u Q_0 + P_1]$
0	1	0	$F(u, v) = \frac{\sqrt{3}}{2 u v^2} \{ u [(1 + v^2) Q_0 - Q_2] + (1 + v^2) P_1 - P_3 \}$
1	1	0	$F(u, v) = \frac{1}{4 u^2 v^2} \{ u^3 [(1 - v^4) Q_2 + 2 v^2 Q_0 - Q_2] + + (1 - v^4) P_1 + 2 v^2 P_3 - P_5 \}$
1	1	1	$F(u, v) = \frac{3}{16 u^2 v^3} \{ u^3 [-(1 - v^2)^2 Q_{-2} + 2 (1 + v^2) Q_0 - Q_2] - - (1 - v^2)^2 P_1 + 2 (1 + v^2) P_3 - P_5 \}$

con

$$Q_r = \frac{(1 + v)^{r+1} - u^{r+1}}{r + 1} \qquad P_s = \frac{u^{s+1} - (1 - v)^{s+1}}{s + 1}$$

Per valori maggiori di l ed l' il calcolo procede più speditamente mediante integrazione numerica secondo la formula di integrazione di Gauss.

Posto:

$$q = \frac{1 + u + v}{2} - \frac{1 + v - u}{2} x$$

nel primo dei due integrali in (26), e

$$q = \frac{1 + u - v}{2} - \frac{u + v - 1}{2} y$$

nell'altro integrale, si ottiene:

$$F(u, v) = \frac{C_{l,M} C_{l',M}}{(2l + 1) u^{l+1} v} \left\{ u^{2l+1} (1 + v - u) \int_{-1}^{1} P_l^M (\xi) P_{l'}^M (t) \frac{dx}{q^l} + \right.$$
$$\left. + (u + v - 1) \int_{-1}^{1} P_l^M (\xi) P_{l'}^M (t) q^{l+1} dy \right\} \qquad (28)$$

Dette $\nu_1, \nu_2, \ldots \nu$ le f ascisse della integrazione numerica di Gauss e $A_1, A_2 \ldots A_f$ i corrispondenti pesi, si ha:

$$F(u, v) = \frac{C_{lM} C_{l'M}}{(2l + 1) u^{l+1} v} \left\{ u^{2l+1} (1 + v - u) \sum_i A_i P_l^M (\xi_i) P_{l'}^M (t_i) \frac{1}{q_i^l} + \right.$$
$$\left. + (u + v - 1) \Sigma_i A_i P_l^M (\xi_i') P_{l'}^M (t_i') q_i'^{l+1} \right\} \qquad (29)$$

con

$$q_i = \frac{1+u+v}{2} - \frac{1+v-u}{2}\,\nu_i$$

$$q_i' = \frac{1+u-v}{2} - \frac{u+v-1}{2}\,\nu_i$$

$$t_i = \frac{1+v^2-q_i^2}{2\,v}$$

$$t_i' = \frac{1+v^2-q_i'^2}{2\,v}$$

$$\xi_i = \frac{1-v\,t_i}{q_i}$$

$$\xi_i' = \frac{1-v\,t_i'}{q_i'}$$

I valori numerici di α, β, β' che compaiono nelle (22) (23) (24) sono riportati nella seguente tabella III.

Poiché la $F(u, v)$ ha espressioni diverse nei 4 campi di variabilità delle u e v, una buona integrazione numerica dell'integrale richiederà di suddividere il campo, nelle medesime 4 parti.

Avremo allora:

$$\begin{aligned} J(l, l', M) = R^{N_1+N_2+1} \Big\{ & \int_{C_1} u^{N_1} v^{N_2} \ldots d\,u\,d\,v + \int_{C_2} \ldots d\,u\,d\,v + \\ & + \int_{C_3} \ldots d\,u\,d\,v + \int_{C_4} \ldots d\,u\,d\,v = \\ = \alpha \frac{(N_1+l)!\,(N_2+l')!}{Z_1^{N_1+l+1} Z_2^{N_2+l'+1}} \; & \frac{1}{R^{l+l'+1}} + R^{N_1+N_2+1} \Big\{ \int_{C_2} u^{N_1} v^{N_2} \cdot \\ & e^{-Z_1 R u - Z_2 R v} \left(\beta \frac{u^l}{v^{l'+1}} - \alpha\, u^l v^{l'}\right) d\,u\,d\,v + \\ & + \int_{C_3} u^{N_1} v^{N_2} e^{-Z_1 R u - Z_2 R v} \left(\beta' \frac{v^{l'}}{u^{l+1}} - \alpha\, u^l v^{l'}\right) d\,u\,d\,v + \\ & \int_{C_4} u^{N_1} v^{N_2} e^{-Z_1 R u - Z_2 R v} \left(F(u\,v) - \alpha\, u^l v^{l'}\right) d\,u\,d\,v \Big\} \end{aligned} \tag{30}$$

Discutiamo ora il calcolo dei tre integrali in parentesi.

In C_2 operiamo il cambiamento di variabili:

$$\begin{cases} u = \dfrac{X}{R(Z_1+Z_2)} & 0 < X < \infty \\ v = 1 + u + \dfrac{Y}{R\,Z_2} & 0 < Y < \infty \end{cases} \qquad |J| = \frac{1}{R^2 (Z_1+Z_2)\, Z_2} \tag{31}$$

si ha allora:

$$\int_{C_2} \ldots \, d\,u\,d\,v = \frac{e^{-Z_2 R}}{R^2 Z_2 (Z_1 + Z_2)} \int_0^\infty e^{-X} d\,X \int_0^\infty e^{-Y} u^{N_1 + l} v^{N_2 - l' - 1} \cdot (\beta - \alpha\, v^{2l' + 1})\, d\,Y$$

In questo modo possiamo applicare la formula di Gauss-Laguerre.

Dette $a_1, a_2; \ldots a_N$ le ascisse di Gauss-Laguerre per una integrazione ad N punti ed $H_1, H_2 \ldots H_N$ i corrispondenti pesi, si ha:

$$\int_{C_2} \ldots = \frac{e^{-Z_2 R}}{R^2 Z_2 (Z_1 + Z_2)} \sum_i H_i u_i^{N_1 + l} \sum_j H_j v_{ij}^{N_2 - l' - 1} (\beta - \alpha\, v_{ij}^{2l' + 1}) \tag{32}$$

dove è:

$$\begin{cases} u_i = \dfrac{a_i}{R(Z_1 + Z_2)} \\ v_{ij} = 1 + u_i + \dfrac{a_j}{R Z_2} \end{cases} \tag{33}$$

Se N_1 ed N_2 fossero interi il numero dei punti da prendere per un risultato esatto dovrebbe essere $\dfrac{N_1 + l}{2} + 1$, e $\dfrac{N_2 + l'}{2} + 1$ rispettivamente; nel caso di esponenti non interi il risultato sarà naturalmente tanto più preciso quanto più è elevato il numero dei punti.

Abbiamo verificato che per n ed l di valore medio, 8-10 punti conducono ad un risultato più che soddisfacente.

In C_3, analogamente a quanto fatto in C_2, poniamo:

$$\begin{cases} v = \dfrac{X}{R(Z_1 + Z_2)} & 0 < X < \infty \\ u = 1 + v + \dfrac{Y}{R Z_1} & 0 < Y < \infty \end{cases} \tag{34}$$

otteniamo quindi:

$$\int_{C_3} \ldots = \frac{e^{-Z_1 R}}{R^2 \cdot Z_1 (Z_1 + Z_2)} \int_0^\infty e^{-X} d\,X \int_0^\infty e^{-Y} u^{N_1 - l - 1} v^{N_2 + l'} \cdot (\beta' - \alpha\, u^{2l + 1})\, d\,Y \tag{35}$$

$$= \frac{e^{-Z_1 R}}{R^2 Z_1 (Z_1 + Z_2)} \sum_i H_i v_i^{N_2 + l'} \sum_j H_j u_{ij}^{N_1 - l - 1} \cdot (\beta' - \alpha\, u_{ij}^{2l + 1})$$

con:

$$\begin{cases} v_i = \dfrac{a_i}{R(Z_1 + Z_2)} \\ u_{ij} = 1 + v_i + \dfrac{a_j}{R Z_1} \end{cases} \tag{36}$$

In C_4 operiamo il cambiamento di variabili:

$$
\begin{aligned}
u &= \frac{1}{2} + \frac{X}{R(Z_1 + Z_2)} - \frac{Y}{2} \qquad -1 < Y < 1 \\
v &= \frac{1}{2} + \frac{X}{R(Z_1 + Z_2)} + \frac{Y}{2} \qquad 0 < X < \infty \\
|J| &= \frac{1}{R(Z_1 + Z_2)}
\end{aligned}
\tag{37}
$$

abbiamo allora:

$$
\int_{C_4} \cdots = \frac{e^{-\frac{Z_1+Z_2}{2}R}}{R\,(Z_1 + Z_2)} \int_{-1}^{1} e^{\frac{Z_1 - Z_2}{2} R\,Y} dY \int_0^\infty e^{-X}\, u^{N_1}\, v^{N_2}\, (F\,(u,v) - \alpha\, u^{l}\, v^{l'})\, d\,X \tag{38}
$$

Qui integriamo la parte in X con la formula di Gauss-Laguerre e la parte in Y con quella di Gauss. Per quest'ultima siano $\nu_1, \nu_2, \ldots \nu_f$ ed $A_1, A_2 \ldots A_f$, rispettivamente, gli f punti ed i relativi pesi; si ha allora:

$$
\int_{C_4} \cdots = \frac{e^{-\frac{Z_1+Z_2}{2}R}}{R\,(Z_1 + Z_2)} \sum_i A_i\, e^{\frac{Z_1 - Z_2}{2} R\, \nu_i} \sum_j H_j\, u_{ij}^{N_1}\, v_{ij}^{N_2} \,.\, (F\,(u_{ij}\, v_{ij}) - \alpha\, u_{ij}^{l}\, v_{ij}^{l'}) \tag{39}
$$

con

$$
\begin{aligned}
u_{ij} &= \frac{1}{2} + \frac{a_j}{R\,(Z_1 + Z_2)} - \frac{\nu_i}{2} \\
v_{ij} &= \frac{1}{2} + \frac{a_j}{R\,(Z_1 + Z_2)} + \frac{\nu_i}{2}
\end{aligned}
\tag{40}
$$

il calcolo di un integrale elementare risulta quindi dall'espressione

$$
\begin{aligned}
J\,(l, l', M) = a\,(l, l', M)\, & \frac{\Gamma\,(N_1 + l + 1)\,\Gamma\,(N_2 + l' + 1)}{Z_1^{N_1 + l + 1}\, Z_2^{N_2 + l' + 1}} \,\cdot \\
& \cdot \frac{1}{R^{l + l' + 1}} + R^{N_1 + N_2} \Big\{ \frac{e^{-Z_2 R}}{R\, Z_2\, (Z_1 + Z_2)} \sum_i H_i\, u_i^{N_1 + l} \,\cdot \\
& \cdot \sum_j H_j\, v_{ij}^{N_2 - l' - 1}\, (\beta - \alpha\, v_{ij}^{2l' + 1}) + \\
& + \frac{e^{-Z_1 R}}{R\, Z_1\, (Z_1 + Z_2)} \sum_i H_i\, v_i^{N_2 + l'} \sum_j H_j\, u_{ij}^{N_1 - l - 1}\, (\beta' - \alpha\, u_{ij}^{2l + 1}) + \\
& + \frac{e^{-\frac{Z_1 + Z_2}{2} R}}{Z_1 + Z_2} \sum_i A_i\, e^{\frac{Z_1 - Z_2}{2} R\, \nu_i} \sum_j H_j\, u_{ij}^{N_1}\, v_{ij}^{N_2} \,\cdot \\
& \cdot (F\,(u_{ij}\, v_{ij}) - \alpha\, u_{ij}^{l}\, v_{ij}^{l'}) \Big\} .
\end{aligned}
\tag{41}
$$

Dove gli u_p ed i v_q che compaiono nelle tre sommatorie doppie sono dati rispettivamente dalle (33), (36), (40). La (41) fornisce il valore di un integrale elementare $i\,(L, l', M)$; un integrale coulombiano si scinde però, come già notato, in una combinazione di alcuni integrali elementari.

I coefficienti di queste combinazioni si ottengono moltiplicando fra loro quelli che compaiono nella tabella II e che corrispondono ad uguali valori di m.

Per comodità abbiamo già eseguito lo sviluppo in integrali elementari per tutti gli integrali coulombiani con orbitali s, p, d ed f, riportando i valori della tabella IV.

Ringraziamo vivamente il Prof. G.B. Bonino per lo stimolo e l'interesse mostrato a questa ricerca.

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TABELLE

TABELLA I.

Decomposizione dei prodotti di funzioni armoniche sferiche.

$$N = 1/\sqrt{2\pi}.$$

$$y_0^0\, y_l^m = N \frac{\sqrt{2}}{2}\, y_l^m.$$

$$y_1^0\, y_1^0 = N \left[\frac{\sqrt{10}}{5}\, y_2^0 + \frac{\sqrt{2}}{2}\, y_0^0\right].$$

$$y_1^0\, y_1^{\pm 1} = N \frac{\sqrt{30}}{10}\, y_2^{\pm 1}.$$

$$y_1^0\, y_2^0 = N \left[\frac{3\sqrt{210}}{70}\, y_3^0 + \frac{\sqrt{10}}{5}\, y_1^0\right].$$

$$y_1^0\, y_2^{\pm 1} = N \left[\frac{2\sqrt{105}}{35}\, y_3^{\pm 1} + \frac{\sqrt{30}}{10}\, y_1^{\pm 1}\right].$$

$$y_1^0\, y_2^{\pm 2} = N \frac{\sqrt{42}}{14}\, y_3^{\pm 2}.$$

$$y_1^0\, y_3^0 = N \left[\frac{2\sqrt{42}}{21}\, y_4^0 + \frac{3\sqrt{210}}{70}\, y_2^0\right].$$

$$y_1^0\, y_3^{\pm 1} = N \left[\frac{\sqrt{70}}{14}\, y_4^{\pm 1} + \frac{2\sqrt{105}}{35}\, y_2^{\pm 1}\right].$$

$$y_1^0\, y_3^{\pm 2} = N \frac{\sqrt{6}}{6}\, y_4^{\pm 2}.$$

$$\begin{cases} y_1^1\, y_1^1 = N \dfrac{\sqrt{15}}{5}\, y_2^2. \\ y_1^1\, y_1^{-1} = N \left[-\dfrac{\sqrt{10}}{10}\, y_2^0 + \dfrac{\sqrt{2}}{2}\, y_0^0\right]. \\ y_1^{-1}\, y_1^{-1} = N \dfrac{\sqrt{15}}{5}\, y_2^{-2}. \end{cases}$$

$$y_1^{\pm 1}\, y_2^0 = N \left[\frac{3\sqrt{35}}{35}\, y_3^{\pm 1} - \frac{\sqrt{10}}{10}\, y_1^{\pm 1}\right].$$

$$\left\{\begin{aligned}
& y_1^1\, y_2^1 = N \frac{\sqrt{21}}{7}\, y_3^2. \\
& y_1^1\, y_2^{-1} = y_1^{-1} y_2^1 = N\left[-\frac{3\sqrt{70}}{70}\, y_3^0 + \frac{\sqrt{30}}{10}\, y_1^0\right]. \\
& y_1^{-1}\, y_2^{-1} = N \frac{\sqrt{21}}{7}\, y_3^{-2}.
\end{aligned}\right.$$

$$\left\{\begin{aligned}
& y_1^1\, y_2^2 = N \frac{3\sqrt{14}}{14}\, y_3^3. \\
& y_1^1\, y_2^{-2} = N\left[-\frac{\sqrt{210}}{70}\, y_3^{-1} + \frac{\sqrt{15}}{5}\, y_1^{-1}\right]. \\
& y_1^{-1}\, y_2^2 = N\left[-\frac{\sqrt{210}}{70}\, y_3^1 + \frac{\sqrt{15}}{5}\, y_1^1\right]. \\
& y_1^{-1}\, y_2^{-2} = N \frac{3\sqrt{14}}{14}\, y_3^{-3}.
\end{aligned}\right.$$

$$y_1^{\pm 1}\, y_3^0 = N\left[\frac{105}{21}\, y_4^{\pm 1} - \frac{3\sqrt{70}}{70}\, y_2^{\pm 1}\right].$$

$$\left\{\begin{aligned}
& y_1^1\, y_3^1 = N\left[\frac{\sqrt{70}}{14}\, y_4^2 - \frac{\sqrt{210}}{70}\, y_2^2\right]. \\
& y_1^1\, y_3^{-1} = y_1^{-1} y_3^1 = N\left[-\frac{\sqrt{7}}{7}\, y_4^0 + \frac{3\sqrt{35}}{35}\, y_2^0\right]. \\
& y_1^{-1}\, y_3^{-1} = N\left[\frac{\sqrt{70}}{14}\, y_4^{-2} - \frac{\sqrt{210}}{70}\, y_2^{-2}\right].
\end{aligned}\right.$$

$$\left\{\begin{aligned}
& y_1^1\, y_3^2 = N \frac{\sqrt{2}}{2}\, y_4^3. \\
& y_1^1\, y_3^{-2} = N\left[-\frac{\sqrt{14}}{14}\, y_4^{-1} + \frac{\sqrt{21}}{7}\, y_2^{-1}\right]. \\
& y_1^{-1}\, y_3^2 = N\left[-\frac{\sqrt{14}}{14}\, y_4^1 + \frac{\sqrt{21}}{7}\, y_2^1\right]. \\
& y_1^{-1}\, y_3^{-2} = N \frac{\sqrt{2}}{2}\, y_4^{-3}.
\end{aligned}\right.$$

$$\begin{cases} y_1^1\, y_3^3 = N \dfrac{\sqrt{6}}{3}\, y_4^4. \\[2ex] y_1^1\, y_3^{-3} = N\left[-\dfrac{\sqrt{42}}{42}\, y_4^{-2} + \dfrac{3\sqrt{14}}{14}\, y_2^{-2}\right]. \\[2ex] y_1^{-1}\, y_3^3 = N\left[-\dfrac{\sqrt{42}}{42}\, y_4^2 + \dfrac{3\sqrt{14}}{14}\, y_2^2\right]. \\[2ex] y_1^{-1}\, y_3^{-3} = N \dfrac{\sqrt{6}}{3}\, y_4^{-4}. \end{cases}$$

$$y_2^0\, y_2^0 = N\left[\frac{3\sqrt{2}}{7}\, y_4^0 + \frac{\sqrt{10}}{7}\, y_2^0 + \frac{\sqrt{2}}{2}\, y_0^0\right].$$

$$y_2^0\, y_2^{\pm 1} = N\left[\frac{\sqrt{15}}{7}\, y_4^{\pm 1} + \frac{\sqrt{10}}{14}\, y_2^{\pm 1}\right].$$

$$y_2^0\, y_2^{\pm 2} = N\left[\frac{\sqrt{30}}{14}\, y_4^{\pm 2} - \frac{\sqrt{10}}{7}\, y_2^{\pm 2}\right].$$

$$y_2^0\, y_3^0 = N\left[\frac{5\sqrt{770}}{231}\, y_5^0 + \frac{2\sqrt{10}}{15}\, y_3^0 + \frac{3\sqrt{210}}{70}\, y_1^0\right].$$

$$y_2^0\, y_3^{\pm 1} = N\left[\frac{5\sqrt{77}}{77}\, y_5^{\pm 1} + \frac{\sqrt{10}}{10}\, y_3^{\pm 1} + \frac{3\sqrt{35}}{35}\, y_1^{\pm 1}\right].$$

$$y_2^0\, y_3^{\pm 2} = N \frac{\sqrt{110}}{22}\, y_5^{\pm 2}.$$

$$y_2^0\, y_3^{\pm 3} = N\left[\frac{\sqrt{110}}{33}\, y_5^{\pm 3} - \frac{\sqrt{10}}{6}\, y_3^{\pm 3}\right].$$

$$\begin{cases} y_2^1\, y_2^1 = N\left[\dfrac{2\sqrt{5}}{7}\, y_4^2 + \dfrac{\sqrt{15}}{7}\, y_2^2\right]. \\[2ex] y_2^1\, y_2^{-1} = N\left[-\dfrac{2\sqrt{2}}{7}\, y_4^0 + \dfrac{\sqrt{10}}{14}\, y_2^0 + \dfrac{\sqrt{2}}{2}\, y_0^0\right] \\[2ex] y_2^{-1}\, y_2^{-1} = N\left[\dfrac{2\sqrt{5}}{7}\, y_4^{-2} + \dfrac{\sqrt{15}}{7}\, y_2^{-2}\right]. \end{cases}$$

$$\begin{cases} y_2^1\, y_2^2 = N \dfrac{\sqrt{70}}{14}\, y_4^3. \\[2ex] y_2^1\, y_2^{-2} = N\left[-\dfrac{\sqrt{10}}{14}\, y_4^{-1} + \dfrac{\sqrt{15}}{7}\, y_2^{-1}\right]. \\[2ex] y_2^{-1}\, y_2^2 = N\left[-\dfrac{\sqrt{10}}{14}\, y_4^1 + \dfrac{\sqrt{15}}{7}\, y_2^1\right]. \\[2ex] y_2^{-1}\, y_2^{-2} = N \dfrac{\sqrt{70}}{14}\, y_4^{-3}. \end{cases}$$

$$y_2^{\pm 1}\, y_3^0 = N\left[\frac{10\sqrt{154}}{231}\, y_5^{\pm 1} + \frac{\sqrt{5}}{15}\, y_3^{\pm 1} - \frac{3\sqrt{70}}{70}\, y_1^{\pm 1}\right].$$

$$\begin{cases} y_2^1\, y_3^1 = N\left[\dfrac{5\sqrt{66}}{66}\, y_5^2 + \dfrac{\sqrt{6}}{6}\, y_3^2\right]. \\[2ex] y_2^1\, y_3^{-1} = y_2^{-1}\, y_3^1 = N\left[-\dfrac{5\sqrt{385}}{231}\, y_5^0 + \dfrac{\sqrt{5}}{15}\, y_3^0 + \dfrac{2\sqrt{105}}{35}\, y_1^0\right]. \\[2ex] y_2^{-1}\, y_3^{-1} = N\left[\dfrac{5\sqrt{66}}{66}\, y_5^{-2} + \dfrac{\sqrt{6}}{6}\, y_3^{-2}\right]. \end{cases}$$

$$\begin{cases} y_2^1\, y_3^2 = N\left[\dfrac{2\sqrt{110}}{33}\, y_5^3 + \dfrac{\sqrt{10}}{6}\, y_3^3\right]. \\[2ex] y_2^1\, y_3^{-2} = N\left[-\dfrac{2\sqrt{1155}}{231}\, y_5^{-1} + \dfrac{\sqrt{6}}{6}\, y_3^{-1} + \dfrac{\sqrt{21}}{7}\, y_1^{-1}\right]. \\[2ex] y_2^{-1}\, y_3^2 = N\left[-\dfrac{2\sqrt{1155}}{231}\, y_5^1 + \dfrac{\sqrt{6}}{6}\, y_3^1 + \dfrac{\sqrt{21}}{7}\, y_1^1\right]. \\[2ex] y_2^{-1}\, y_3^{-2} = N\left[\dfrac{2\sqrt{110}}{33}\, y_5^{-3} + \dfrac{\sqrt{10}}{6}\, y_3^{-3}\right]. \end{cases}$$

$$\begin{cases} y_2^1\, y_3^3 = N \dfrac{\sqrt{330}}{33}\, y_5^4. \\[2ex] y_2^1\, y_3^{-3} = N\left[-\dfrac{\sqrt{110}}{66}\, y_5^{-2} + \dfrac{\sqrt{10}}{6}\, y_3^{-2}\right]. \\[2ex] y_2^{-1}\, y_3^3 = N\left[-\dfrac{\sqrt{110}}{66}\, y_5^2 + \dfrac{\sqrt{10}}{6}\, y_3^2\right]. \\[2ex] y_2^{-1}\, y_3^{-3} = N \dfrac{\sqrt{330}}{33}\, y_5^{-4}. \end{cases}$$

$$\left\{\begin{aligned}
&y_2^2\, y_2^2 = N\frac{\sqrt{35}}{7}\, y_4^4.\\
&y_2^2\, y_2^{-2} = N\left[\frac{\sqrt{2}}{14}\, y_4^0 - \frac{\sqrt{10}}{7}\, y_2^0 + \frac{\sqrt{2}}{2}\, y_0^0\right].\\
&y_2^{-2}\, y_2^{-2} = N\frac{\sqrt{35}}{7}\, y_4^{-4}.
\end{aligned}\right.$$

$$y_2^{\pm 2}\, y_3^0 = N\left[\frac{5\sqrt{22}}{66}\, y_5^{\pm 2} - \frac{\sqrt{2}}{3}\, y_3^{\pm 2}\right].$$

$$\left\{\begin{aligned}
&y_2^2\, y_3^1 = N\left[\frac{5\sqrt{11}}{33}\, y_5^3 - \frac{1}{3}\, y_3^3\right].\\
&y_2^2\, y_3^{-1} = N\left[-\frac{5\sqrt{462}}{462}\, y_5^1 + \frac{2\sqrt{15}}{15}\, y_3^1 - \frac{\sqrt{210}}{70}\, y_1^1\right].\\
&y_2^{-2}\, y_3^1 = N\left[-\frac{5\sqrt{462}}{462}\, y_5^{-1} + \frac{2\sqrt{15}}{15}\, y_3^{-1} - \frac{\sqrt{210}}{70}\, y_1^{-1}\right].\\
&y_2^{-2}\, y_3^{-1} = N\left[\frac{5\sqrt{11}}{33}\, y_5^{-3} - \frac{1}{3}\, y_3^{-3}\right].
\end{aligned}\right.$$

$$\left\{\begin{aligned}
&y_2^2\, y_3^2 = N\frac{\sqrt{55}}{11}\, y_5^4.\\
&y_2^{-2}\, y_3^2 = y_2^2\, y_3^{-2} = N\left[\frac{5\sqrt{154}}{462}\, y_5^0 - \frac{\sqrt{2}}{3}\, y_3^0 + \frac{\sqrt{42}}{14}\, y_1^0\right].\\
&y_2^{-2}\, y_3^{-2} = N\frac{\sqrt{55}}{11}\, y_5^{-4}.
\end{aligned}\right.$$

$$\left\{\begin{aligned}
&y_2^2\, y_3^3 = N\frac{5\sqrt{39}}{39}\, y_5^5.\\
&y_2^2\, y_3^{-3} = N\left[\frac{\sqrt{770}}{462}\, y_5^{-1} - \frac{1}{3}\, y_3^{-1} + \frac{3\sqrt{350}}{70}\, y_1^{-1}\right].\\
&y_2^{-2}\, y_3^3 = N\left[\frac{\sqrt{770}}{462}\, y_5^1 - \frac{1}{3}\, y_3^1 + \frac{3\sqrt{350}}{70}\, y_1^1\right].\\
&y_2^{-2}\, y_3^{-3} = N\frac{5\sqrt{39}}{39}\, y_5^{-5}.
\end{aligned}\right.$$

$$y_3^0\, y_3^0 = N\left[\frac{50\sqrt{26}}{429}\, y_6^0 + \frac{3\sqrt{2}}{11}\, y_4^0 + \frac{2\sqrt{10}}{15}\, y_2^0 + \frac{\sqrt{2}}{2}\, y_0^0\right].$$

$$y_3^0\, y_3^{\pm 1} = N\left[\frac{25\sqrt{91}}{429}\, y_6^{\pm 1} + \frac{\sqrt{30}}{22}\, y_4^{\pm 1} + \frac{\sqrt{5}}{15}\, y_2^{\pm 1}\right].$$

$$y_3^0\, y_3^{\pm 2} = N\left[\frac{20\sqrt{91}}{429}\, y_6^{\pm 2} - \frac{\sqrt{6}}{22}\, y_4^{\pm 2} - \frac{\sqrt{2}}{3}\, y_2^{\pm 2}\right].$$

$$y_3^0\, y_3^{\pm 3} = N\left[\frac{5\sqrt{546}}{429}\, y_6^{\pm 3} - \frac{3\sqrt{14}}{22}\, y_4^{\pm 3}\right].$$

$$\begin{cases} y_3^1\, y_3^1 = N\left[\frac{5\sqrt{2730}}{429}\, y_6^2 + \frac{2\sqrt{5}}{11}\, y_4^2 + \frac{2\sqrt{15}}{15}\, y_2^2\right]. \\ y_3^{-1}\, y_3^1 = y_3^1\, y_3^{-1} = N\left[-\frac{25\sqrt{26}}{286}\, y_6^0\right]. \\ y_3^{-1}\, y_3^{-1} = N\left[\frac{5\sqrt{2730}}{429}\, y_6^{-2} + \frac{2\sqrt{5}}{11}\, y_4^{-2} + \frac{2\sqrt{15}}{15}\, y_2^{-2}\right]. \end{cases}$$

$$\begin{cases} y_3^1\, y_3^2 = N\left[\frac{5\sqrt{273}}{143}\, y_6^3 + \frac{\sqrt{7}}{11}\, y_4^3\right]. \\ y_3^1\, y_3^{-2} = N\left[-\frac{5\sqrt{2730}}{858}\, y_6^{-1} + \frac{4}{11}\, y_4^{-1} + \frac{\sqrt{6}}{6}\, y_2^{-1}\right]. \\ y_3^{-1}\, y_3^2 = N\left[-\frac{5\sqrt{2730}}{858}\, y_6^1 + \frac{4}{11}\, y_4^1 + \frac{\sqrt{6}}{6}\, y_2^1\right]. \\ y_3^{-1}\, y_3^{-2} = N\left[\frac{5\sqrt{273}}{143}\, y_6^{-3} + \frac{\sqrt{7}}{11}\, y_4^{-3}\right]. \end{cases}$$

$$\begin{cases} y_3^1\, y_3^3 = N\left[\frac{5\sqrt{1365}}{429}\, y_6^4 - \frac{\sqrt{21}}{11}\, y_4^4\right]. \\ y_3^1\, y_3^{-3} = N\left[-\frac{5\sqrt{182}}{429}\, y_6^{-2} + \frac{3\sqrt{3}}{11}\, y_4^{-2} - \frac{1}{3}\, y_2^{-2}\right]. \\ y_3^{-1}\, y_3^3 = N\left[-\frac{5\sqrt{182}}{429}\, y_6^2 + \frac{3\sqrt{3}}{11}\, y_4^2 - \frac{1}{3}\, y_2^2\right]. \\ y_3^{-3}\, y_3^{-1} = N\left[\frac{5\sqrt{1365}}{429}\, y_6^{-4} - \frac{\sqrt{21}}{11}\, y_4^{-4}\right]. \end{cases}$$

$$\begin{cases} y_3^2\, y_3^2 = N\left[\frac{10\sqrt{91}}{143}\, y_6^4 + \frac{\sqrt{35}}{11}\, y_4^4\right]. \\ y_3^2\, y_3^{-2} = y_3^{-2}\, y_3^2 = N\left[\frac{5\sqrt{26}}{143}\, y_6^0 - \frac{7\sqrt{2}}{22}\, y_4^0 + \frac{\sqrt{2}}{2}\, y_0^0\right]. \\ y_3^{-2}\, y_3^{-2} = N\left[\frac{10\sqrt{91}}{143}\, y_6^{-4} + \frac{\sqrt{35}}{11}\, y_4^{-4}\right]. \end{cases}$$

$$\left\{\begin{aligned}
y_3^2\, y_3^3 &= N\,\frac{5\sqrt{3003}}{429}\, y_6^5. \\
y_3^2\, y_3^{-3} &= N\left[\frac{5\sqrt{182}}{858}\, y_6^{-1} - \frac{3\sqrt{15}}{33}\, y_4^{-1} + \frac{\sqrt{10}}{6}\, y_2^{-1}\right]. \\
y_3^{-2}\, y_3^3 &= N\left[\frac{5\sqrt{182}}{858}\, y_6^1 - \frac{3\sqrt{15}}{33}\, y_4^1 + \frac{\sqrt{10}}{6}\, y_2^{-1}\right]. \\
y_3^{-2}\, y_3^{-3} &= N\,\frac{5\sqrt{3003}}{429}\, y_6^{-5}.
\end{aligned}\right.$$

$$\left\{\begin{aligned}
y_3^3\, y_3^3 &= N\,\frac{5\sqrt{6006}}{429}\, y_6^6. \\
y_3^{-3}\, y_3^3 = y_3^3\, y_3^{-3} &= N\left[-\frac{5\sqrt{26}}{858}\, y_6^0 + \frac{3\sqrt{2}}{22}\, y_4^0 - \frac{\sqrt{10}}{6}\, y_2^0 + \frac{\sqrt{2}}{2}\, y_0^0\right]. \\
y_3^{-3}\, y_3^{-3} &= N\,\frac{5\sqrt{6006}}{429}\, y_6^{-6}.
\end{aligned}\right.$$

Tabella II.

Decomposizioni dei prodotti di funzioni reali $S_{l,m}$.

$N = 1/\sqrt{2\pi}$.

$s\,s = N\frac{\sqrt{2}}{2}S_{0,0}$.

$s\,p_0 = N\frac{\sqrt{2}}{2}S_{1,0}$.

$s\,p_1 = N\frac{\sqrt{2}}{2}S_{1,1}$.

$s\,p_{-1} = N\frac{\sqrt{2}}{2}S_{1,-1}$.

$s\,d_0 = N\frac{\sqrt{2}}{2}S_{2,0}$.

$s\,d_1 = N\frac{\sqrt{2}}{2}S_{2,1}$.

$s\,d_{-1} = N\frac{\sqrt{2}}{2}S_{2,-1}$.

$s\,d_2 = N\frac{\sqrt{2}}{2}S_{2,2}$.

$s\,d_{-2} = N\frac{\sqrt{2}}{2}S_{2,-2}$.

$s\,f_0 = N\frac{\sqrt{2}}{2}S_{3,0}$.

$s\,f_1 = N\frac{\sqrt{2}}{2}S_{3,1}$.

$s\,f_{-1} = N\frac{\sqrt{2}}{2}S_{3,-1}$.

$s\,f_2 = N\frac{\sqrt{2}}{2}S_{3,2}$.

$s\,f_{-2} = N\frac{\sqrt{2}}{2}S_{3,-2}$.

$s\,f_3 = N\frac{\sqrt{2}}{2}S_{3,3}$.

$s\,f_{-3} = N\frac{\sqrt{2}}{2}S_{3,-3}$.

$p_0\,p_0 = N\left[\frac{\sqrt{10}}{5}S_{2,0} + \frac{\sqrt{2}}{2}S_{0,0}\right]$.

$p_0\,p_{-1} = N\frac{\sqrt{30}}{10}S_{2,-1}$.

$p_0\,p_1 = N\frac{\sqrt{30}}{10}S_{2,1}$.

$p_0\,d_0 = N\left[\frac{3\sqrt{210}}{70}S_{3,0} + \frac{\sqrt{10}}{5}S_{1,0}\right]$.

$p_0\,d_1 = N\left[\frac{2\sqrt{105}}{35}S_{3,1} + \frac{\sqrt{30}}{10}S_{1,1}\right]$.

$p_0\,d_{-1} = N\left[\frac{2\sqrt{105}}{35}S_{3,-1} + \frac{\sqrt{30}}{10}S_{1,-1}\right]$.

$p_0\,d_2 = N\frac{\sqrt{42}}{14}S_{3,2}$.

$p_0\,d_{-2} = N\frac{\sqrt{42}}{14}S_{3,-2}$.

$p_0\,f_0 = N\left[\frac{2\sqrt{42}}{21}S_{4,0} + \frac{3\sqrt{210}}{70}S_{2,0}\right]$.

$$p_0\, f_1 = N\left[\frac{\sqrt{70}}{14}\, S_{4,1} + \frac{2\,\sqrt{105}}{35}\, S_{2,1}\right].$$

$$p_0\, f_{-1} = N\left[\frac{\sqrt{70}}{14}\, S_{4,-1} + \frac{2\,\sqrt{105}}{35}\, S_{2,-1}\right].$$

$$p_0\, f_2 = N\left[\frac{\sqrt{14}}{7}\, S_{4,2} + \frac{\sqrt{42}}{14}\, S_{2,2}\right]. \qquad p_0\, f_{-2} = N\left[\frac{\sqrt{14}}{7}\, S_{4,-2} + \frac{\sqrt{42}}{14}\, S_{2,-2}\right].$$

$$p_0\, f_3 = N\,\frac{\sqrt{6}}{6}\, S_{4,3}. \qquad p_0\, f_{-3} = N\,\frac{\sqrt{6}}{6}\, S_{4,-3}.$$

$$p_1\, p_1 = N\left[\frac{\sqrt{30}}{10}\, S_{2,2} - \frac{\sqrt{10}}{10}\, S_{2,0} + \frac{\sqrt{2}}{2}\, S_{0,0}\right]. \quad p_1\, p_{-1} = N\,\frac{\sqrt{30}}{10}\, S_{2,-2}.$$

$$p_1\, d_0 = N\left[\frac{3\,\sqrt{35}}{35}\, S_{3,1} - \frac{\sqrt{10}}{10}\, S_{1,1}\right].$$

$$p_1\, d_1 = N\left[\frac{\sqrt{42}}{14}\, S_{3,2} - \frac{3\,\sqrt{70}}{70}\, S_{3,0} + \frac{\sqrt{30}}{10}\, S_{1,0}\right]. \qquad p_1\, d_{-1} = N\,\frac{\sqrt{42}}{14}\, S_{3,-2}$$

$$p_1\, d_2 = N\left[\frac{3\,\sqrt{7}}{14}\, S_{3,3} - \frac{\sqrt{105}}{70}\, S_{3,1} + \frac{\sqrt{30}}{10}\, S_{1,1}\right].$$

$$p_1\, d_{-2} = N\left[\frac{3\,\sqrt{7}}{14}\, S_{3,-3} - \frac{\sqrt{105}}{70}\, S_{3,-1} + \frac{\sqrt{30}}{10}\, S_{1,-1}\right].$$

$$p_1\, f_0 = N\left[\frac{\sqrt{105}}{21}\, S_{4,1} - \frac{3\,\sqrt{70}}{70}\, S_{2,1}\right]:$$

$$p_1\, f_1 = N\left[\frac{\sqrt{35}}{14}\, S_{4,2} - \frac{\sqrt{105}}{70}\, S_{2,2} - \frac{\sqrt{7}}{7}\, S_{4,0} + \frac{3\,\sqrt{35}}{35}\, S_{2,0}\right].$$

$$p_1\, f_{-1} = N\left[\frac{\sqrt{35}}{14}\, S_{4,-2} - \frac{\sqrt{105}}{70}\, S_{2,-2}\right].$$

$$p_1\, f_2 = N\left[\frac{1}{2}\, S_{4,3} - \frac{\sqrt{7}}{14}\, S_{4,1} + \frac{\sqrt{42}}{14}\, S_{2,1}\right].$$

$$p_1\, f_{-2} = N\left[\frac{1}{2}\, S_{4,-3} - \frac{\sqrt{7}}{14}\, S_{4,-1} + \frac{\sqrt{42}}{14}\, S_{2,-1}\right].$$

$$p_1\, f_3 = N\left[\frac{\sqrt{3}}{3}\, S_{4,4} - \frac{\sqrt{21}}{42}\, S_{4,2} + \frac{3\,\sqrt{7}}{14}\, S_{2,2}\right].$$

$$p_1\, f_{-3} = N\left[\frac{\sqrt{3}}{3}\, S_{4,-4} - \frac{\sqrt{21}}{42}\, S_{4,-2} + \frac{3\,\sqrt{7}}{14}\, S_{2,-2}\right].$$

$$p_{-1}\,p_{-1} = -N\left[\frac{\sqrt{30}}{10}S_{2,2} + \frac{\sqrt{10}}{10}S_{2,0} - \frac{\sqrt{2}}{2}S_{0,0}\right].$$

$$p_{-1}\,d_0 = N\left[\frac{3\sqrt{35}}{35}S_{3,-1} - \frac{\sqrt{10}}{10}S_{1,-1}\right]. \qquad p_{-1}\,d_1 = N\frac{\sqrt{42}}{14}S_{3,-2}.$$

$$p_{-1}\,d_{-1} = -N\left[\frac{\sqrt{42}}{14}S_{3,-2} + \frac{3\sqrt{70}}{70}S_{3,0} - \frac{\sqrt{30}}{10}S_{1,0}\right].$$

$$p_{-1}\,d_2 = N\left[\frac{3\sqrt{7}}{14}S_{3,-3} - \frac{\sqrt{105}}{70}S_{3,-1} - \frac{\sqrt{30}}{10}S_{1,-1}\right].$$

$$p_{-1}\,d_{-2} = -N\left[\frac{3\sqrt{7}}{14}S_{3,3} + \frac{\sqrt{105}}{70}S_{3,1} - \frac{\sqrt{30}}{10}S_{1,1}\right].$$

$$p_{-1}\,f_0 = N\left[\frac{\sqrt{105}}{21}S_{4,-1} - \frac{3\sqrt{70}}{70}S_{2,-1}\right].$$

$$p_{-1}\,f_1 = N\left[\frac{\sqrt{35}}{14}S_{4,-2} - \frac{\sqrt{105}}{70}S_{2,-2}\right]$$

$$p_{-1}\,f_{-1} = -N\left[\frac{\sqrt{35}}{14}S_{4,2} - \frac{\sqrt{105}}{70}S_{2,2} + \frac{\sqrt{7}}{7}S_{4,0} - \frac{3\sqrt{35}}{35}S_{2,0}\right].$$

$$p_{-1}\,f_2 = N\left[\frac{\sqrt{16}}{8}S_{4,-3} + \frac{\sqrt{7}}{14}S_{4,-1} - \frac{\sqrt{42}}{14}S_{2,-1}\right].$$

$$p_{-1}\,f_{-2} = -N\left[\frac{\sqrt{16}}{8}S_{4,3} + \frac{\sqrt{7}}{14}S_{4,1} - \frac{\sqrt{42}}{14}S_{2,1}\right].$$

$$p_{-1}\,f_3 = N\left[\frac{\sqrt{12}}{6}S_{4,-4} + \frac{\sqrt{21}}{42}S_{4,-2} - \frac{3\sqrt{7}}{14}S_{2,-2}\right].$$

$$p_{-1}\,f_{-3} = -N\left[\frac{\sqrt{12}}{6}S_{4,4} + \frac{\sqrt{21}}{42}S_{4,2} - \frac{3\sqrt{7}}{14}S_{2,2}\right].$$

$$d_0\,d_0 = N\left[\frac{3\sqrt{2}}{7}S_{4,0} + \frac{\sqrt{10}}{7}S_{2,0} + \frac{\sqrt{2}}{2}S_{0,0}\right].$$

$$d_0\,d_1 = N\left[\frac{\sqrt{15}}{7}S_{4,1} + \frac{\sqrt{10}}{14}S_{2,1}\right].$$

$$d_0\,d_{-1} = N\left[\frac{\sqrt{15}}{7}S_{4,-1} + \frac{\sqrt{10}}{14}S_{2,-1}\right].$$

$$d_0\,d_2 = N\left[\frac{\sqrt{30}}{14}S_{4,2} - \frac{\sqrt{10}}{7}S_{2,2}\right].$$

$$d_0\, d_{-2} = N\left[\frac{\sqrt{30}}{14} S_{4,-2} - \frac{\sqrt{10}}{7} S_{2,-2}\right].$$

$$d_0\, f_0 = N\left[\frac{5\sqrt{770}}{231} S_{5,0} + \frac{2\sqrt{10}}{15} S_{3,0} + \frac{3\sqrt{210}}{70} S_{1,0}\right].$$

$$d_0\, f_1 = N\left[\frac{5\sqrt{77}}{77} S_{5,1} + \frac{\sqrt{10}}{10} S_{3,1} + \frac{3\sqrt{35}}{35} S_{1,1}\right].$$

$$d_0\, f_{-1} = N\left[\frac{5\sqrt{77}}{77} S_{5,-1} + \frac{\sqrt{10}}{10} S_{3,-1} + \frac{3\sqrt{35}}{35} S_{1,-1}\right].$$

$$d_0\, f_2 = N\frac{\sqrt{110}}{22} S_{5,2}. \qquad d_0\, f_{-2} = N\frac{\sqrt{110}}{22} S_{5,-2}.$$

$$d_0\, f_3 = N\left[\frac{\sqrt{110}}{33} S_{5,3} - \frac{\sqrt{10}}{6} S_{3,3}\right].$$

$$d_0\, f_{-3} = N\left[\frac{\sqrt{110}}{33} S_{5,-3} - \frac{\sqrt{10}}{6} S_{3,-3}\right].$$

$$d_1\, d_1 = N\left[\frac{\sqrt{10}}{7} S_{4,2} + \frac{\sqrt{30}}{14} S_{2,2} - \frac{2\sqrt{2}}{7} S_{4,0} + \frac{\sqrt{10}}{14} S_{2,0} + \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$d_1\, d_{-1} = N\left[\frac{\sqrt{10}}{7} S_{4,-2} + \frac{\sqrt{30}}{14} S_{2,-2}\right].$$

$$d_1\, d_2 = N\left[\frac{\sqrt{35}}{14} S_{4,3} - \frac{\sqrt{5}}{14} S_{4,1} + \frac{\sqrt{30}}{14} S_{2,1}\right].$$

$$d_1\, d_{-2} = N\left[\frac{\sqrt{35}}{14} S_{4,-3} - \frac{\sqrt{5}}{14} S_{4,-1} + \frac{\sqrt{30}}{14} S_{2,-1}\right].$$

$$d_1\, f_0 = N\left[\frac{10\sqrt{154}}{231} S_{5,1} + \frac{\sqrt{5}}{15} S_{3,1} - \frac{3\sqrt{70}}{70} S_{1,1}\right].$$

$$d_1\, f_1 = N\left[\frac{5\sqrt{33}}{66} S_{5,2} + \frac{\sqrt{3}}{6} S_{3,2} - \frac{5\sqrt{385}}{231} S_{5,0} + \frac{\sqrt{5}}{15} S_{3,0} + \frac{2\sqrt{105}}{35} S_{1,0}\right];$$

$$d_1\, f_{-1} = N\left[\frac{5\sqrt{33}}{66} S_{5,-2} + \frac{\sqrt{3}}{6} S_{3,-2}\right].$$

$$d_1\, f_2 = N\left[\frac{2\sqrt{55}}{33} S_{5,3} + \frac{\sqrt{5}}{6} S_{3,3} - \frac{\sqrt{2310}}{231} S_{5,1} + \frac{\sqrt{3}}{6} S_{3,1} + \frac{\sqrt{42}}{14} S_{1,1}\right].$$

$$d_1\, f_{-2} = N\left[\frac{2\sqrt{55}}{33} S_{5,-3} + \frac{\sqrt{5}}{6} S_{3,-3} - \frac{\sqrt{2310}}{231} S_{5,-1} + \frac{\sqrt{3}}{6} S_{3,-1} + \frac{\sqrt{42}}{14} S_{1,-1}\right].$$

$$d_1 f_3 = N\left[\frac{\sqrt{165}}{33} S_{5,4} - \frac{\sqrt{55}}{66} S_{5,2} + \frac{\sqrt{5}}{6} S_{3,2}\right].$$

$$d_1 f_{-3} = N\left[\frac{\sqrt{165}}{33} S_{5,-4} - \frac{\sqrt{55}}{66} S_{5,-2}\right].$$

$$d_{-1} d_{-1} = -N\left[\frac{\sqrt{10}}{7} S_{4,2} + \frac{\sqrt{30}}{14} S_{2,2} + \frac{2\sqrt{2}}{7} S_{4,0} - \frac{\sqrt{10}}{4} S_{2,0} - \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$d_{-1} d_2 = N\left[\frac{\sqrt{35}}{14} S_{4,-3} + \frac{\sqrt{5}}{14} S_{4,-1} - \frac{\sqrt{30}}{14} S_{2,-1}\right].$$

$$d_{-1} d_{-2} = -N\left[\frac{\sqrt{35}}{14} S_{4,3} + \frac{\sqrt{5}}{14} S_{4,1} - \frac{\sqrt{30}}{14} S_{2,1}\right].$$

$$d_{-1} f_0 = N\left[\frac{10\sqrt{154}}{231} S_{5,-1} + \frac{\sqrt{5}}{15} S_{3,-1} - \frac{3\sqrt{70}}{70} S_{1,-1}\right];$$

$$d_{-1} f_1 = N\left[\frac{5\sqrt{33}}{66} S_{5,-2} + \frac{\sqrt{3}}{6} S_{3,-2}\right].$$

$$d_{-1} f_{-1} = -N\left[\frac{5\sqrt{33}}{66} S_{5,2} + \frac{\sqrt{3}}{6} S_{3,2} + \frac{5\sqrt{385}}{231} S_{5,0} - \frac{\sqrt{5}}{15} S_{3,0} - \frac{2\sqrt{105}}{35} S_{1,0}\right].$$

$$d_{-1} f_2 = N\left[\frac{2\sqrt{55}}{33} S_{5,-3} + \frac{\sqrt{5}}{6} S_{3,-3} - \frac{\sqrt{2310}}{231} S_{5,-1} + \frac{\sqrt{3}}{6} S_{3,-1} + \frac{\sqrt{42}}{14} S_{1,-1}\right].$$

$$d_{-1} f_{-2} = -N\left[\frac{2\sqrt{55}}{33} S_{5,3} + \frac{\sqrt{5}}{6} S_{3,3} + \frac{\sqrt{2310}}{231} S_{5,1} - \frac{\sqrt{3}}{6} S_{3,1} - \frac{\sqrt{42}}{14} S_{1,1}\right].$$

$$d_{-1} f_3 = N\left[\frac{\sqrt{165}}{33} S_{5,-4} - \frac{\sqrt{55}}{66} S_{5,-2} + \frac{\sqrt{5}}{6} S_{3,-2}\right].$$

$$d_{-1} f_{-3} = -N\left[\frac{\sqrt{165}}{33} S_{5,4} + \frac{\sqrt{55}}{66} S_{5,2} - \frac{\sqrt{5}}{6} S_{3,2}\right].$$

$$d_2 d_2 = N\left[\frac{\sqrt{70}}{14} S_{4,4} + \frac{\sqrt{2}}{14} S_{4,0} - \frac{\sqrt{10}}{7} S_{2,0} + \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$d_2 d_{-2} = N \frac{\sqrt{70}}{14} S_{4,-4}. \qquad d_2 f_0 = N\left[\frac{5\sqrt{22}}{66} S_{5,2} - \frac{\sqrt{2}}{3} S_{3,2}\right].$$

$$d_2 f_1 = N\left[\frac{5\sqrt{22}}{66} S_{5,3} - \frac{\sqrt{2}}{6} S_{3,3} - \frac{5\sqrt{231}}{462} S_{5,1} + \frac{\sqrt{30}}{15} S_{3,1} - \frac{\sqrt{105}}{70} S_{1,1}\right].$$

$$d_2 f_{-1} = N\left[\frac{5\sqrt{22}}{66} S_{5,-3} - \frac{\sqrt{2}}{6} S_{3,-3} - \frac{5\sqrt{231}}{462} S_{5,-1} + \frac{\sqrt{30}}{15} S_{3,-1} - \frac{\sqrt{105}}{70} S_{1,-1}\right].$$

$$d_2 f_2 = N\left[\frac{\sqrt{165}}{33} S_{5,4} + \frac{5\sqrt{154}}{462} S_{5,0} - \frac{\sqrt{2}}{3} S_{3,0} + \frac{\sqrt{42}}{14} S_{1,0}\right].$$

$$d_2 f_{-2} = N \frac{\sqrt{165}}{33} S_{5,-4}.$$

$$d_2 f_3 = N\left[\frac{5\sqrt{78}}{78} S_{5,5} + \frac{\sqrt{385}}{462} S_{5,1} - \frac{\sqrt{2}}{6} S_{3,1} + \frac{3\sqrt{7}}{14} S_{1,1}\right].$$

$$d_2 f_{-3} = N\left[\frac{5\sqrt{78}}{78} S_{5,-5} + \frac{\sqrt{385}}{462} S_{5,-1} - \frac{\sqrt{2}}{6} S_{3,-1} + \frac{3\sqrt{7}}{14} S_{1,-1}\right].$$

$$d_{-2} d_{-2} = -N\left[\frac{\sqrt{70}}{14} S_{4,4} - \frac{\sqrt{2}}{14} S_{4,0} + \frac{\sqrt{10}}{7} S_{2,0} - \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$d_{-2} f_0 = N\left[\frac{5\sqrt{22}}{66} S_{5,-2} - \frac{\sqrt{2}}{3} S_{3,-2}\right].$$

$$d_{-2} f_1 = N\left[\frac{5\sqrt{22}}{66} S_{5,-3} - \frac{\sqrt{2}}{6} S_{3,-3} + \frac{5\sqrt{231}}{462} S_{5,-1} - \frac{\sqrt{30}}{15} S_{3,-1} + \frac{\sqrt{105}}{70} S_{1,-1}\right].$$

$$d_{-2} f_{-1} = -N\left[\frac{5\sqrt{22}}{66} S_{5,3} - \frac{\sqrt{2}}{6} S_{3,3} + \frac{5\sqrt{231}}{462} S_{5,1} - \frac{\sqrt{30}}{15} S_{3,1} + \frac{\sqrt{105}}{70} S_{1,1}\right].$$

$$d_{-2} f_2 = N \frac{\sqrt{165}}{33} S_{5,-4}.$$

$$d_{-2} f_{-2} = -N\left[\frac{\sqrt{165}}{33} S_{5,4} - \frac{5\sqrt{154}}{462} S_{5,0} + \frac{\sqrt{2}}{3} S_{3,0} - \frac{\sqrt{42}}{14} S_{1,0}\right].$$

$$d_{-2} f_3 = N\left[\frac{5\sqrt{78}}{78} S_{5,-5} - \frac{\sqrt{385}}{462} S_{5,-1} + \frac{\sqrt{2}}{6} S_{3,-1} + \frac{3\sqrt{7}}{14} S_{1,-1}\right].$$

$$d_{-2} f_{-3} = -N\left[\frac{5\sqrt{78}}{78} S_{5,5} - \frac{\sqrt{385}}{462} S_{5,1} + \frac{\sqrt{2}}{6} S_{3,1} + \frac{3\sqrt{7}}{14} S_{1,1}\right].$$

$$f_0 f_0 = N\left[\frac{50\sqrt{26}}{429} S_{6,0} + \frac{3\sqrt{2}}{11} S_{4,0} + \frac{2\sqrt{10}}{15} S_{2,0} + \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$f_0 f_1 = N\left[\frac{50\sqrt{91}}{936} S_{6,1} + \frac{\sqrt{30}}{22} S_{4,1} + \frac{\sqrt{5}}{15} S_{2,1}\right].$$

$$f_0 f_{-1} = N\left[\frac{50\sqrt{91}}{936} S_{6,-1} + \frac{\sqrt{30}}{22} S_{4,-1} + \frac{\sqrt{5}}{15} S_{2,-1}\right].$$

$$f_0 f_2 = N\left[\frac{2\sqrt{91}}{39} S_{6,2} - \frac{\sqrt{6}}{22} S_{4,2} - \frac{\sqrt{2}}{3} S_{2,2}\right].$$

$$f_0 f_{-2} = N\left[\frac{2\sqrt{91}}{39} S_{6,-2} - \frac{\sqrt{6}}{22} S_{4,-2} - \frac{\sqrt{2}}{3} S_{2,-2}\right].$$

$$f_0 f_3 = N\left[\frac{5\sqrt{546}}{429} S_{6,3} - \frac{3\sqrt{14}}{22} S_{4,3}\right].$$

$$f_0 f_{-3} = N\left[\frac{5\sqrt{546}}{429} S_{6,-3} - \frac{3\sqrt{14}}{22} S_{4,-3}\right].$$

$$f_1 f_1 = N\left[\frac{5\sqrt{1365}}{429} S_{6,2} + \frac{\sqrt{10}}{11} S_{4,2} + \frac{\sqrt{30}}{15} S_{2,2} - \frac{25\sqrt{26}}{286} S_{6,0} + \frac{\sqrt{2}}{22} S_{4,0} + \frac{\sqrt{10}}{10} S_{2,0} + \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$f_1 f_{-1} = N\left[\frac{5\sqrt{1365}}{429} S_{6,-2} + \frac{\sqrt{10}}{11} S_{4,-2} + \frac{\sqrt{30}}{15} S_{2,-2}\right].$$

$$f_1 f_2 = N\left[\frac{5\sqrt{546}}{286} S_{6,3} + \frac{\sqrt{14}}{22} S_{4,3} - \frac{5\sqrt{1365}}{858} S_{6,1} + \frac{2\sqrt{2}}{11} S_{4,1} + \frac{\sqrt{3}}{6} S_{2,1}\right].$$

$$f_1 f_{-2} = N\left[\frac{5\sqrt{546}}{286} S_{6,-3} + \frac{\sqrt{14}}{22} S_{4,-3} - \frac{5\sqrt{1365}}{858} S_{6,-1} + \frac{2\sqrt{2}}{11} S_{4,-1} + \frac{\sqrt{3}}{6} S_{2,-1}\right].$$

$$f_1 f_3 = N\left[\frac{5\sqrt{2730}}{858} S_{6,4} - \frac{\sqrt{42}}{22} S_{4,4} - \frac{5\sqrt{91}}{429} S_{6,2} + \frac{3\sqrt{6}}{22} S_{4,2} - \frac{\sqrt{2}}{6} S_{2,2}\right].$$

$$f_1 f_{-3} = N\left[\frac{5\sqrt{2730}}{858} S_{6,-4} - \frac{\sqrt{42}}{22} S_{4,-4} - \frac{5\sqrt{91}}{429} S_{6,-2} + \frac{3\sqrt{6}}{22} S_{4,-2} - \frac{\sqrt{2}}{6} S_{2,-2}\right].$$

$$f_{-1} f_{-1} = -N\left[\frac{5\sqrt{546}}{429} S_{6,2} + \frac{\sqrt{10}}{11} S_{4,2} + \frac{\sqrt{30}}{15} S_{2,2} + \frac{25\sqrt{26}}{286} S_{6,0} - \frac{\sqrt{2}}{22} S_{4,0} - \frac{\sqrt{10}}{10} S_{2,0} - \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$f_{-1} f_2 = N\left[\frac{5\sqrt{546}}{286} S_{6,-3} + \frac{\sqrt{14}}{22} S_{4,-3} + \frac{5\sqrt{1365}}{858} S_{6,-1} - \frac{2\sqrt{2}}{11} S_{4,-1} - \frac{\sqrt{3}}{6} S_{2,-1}\right].$$

$$f_{-1} f_{-2} = -N\left[\frac{5\sqrt{546}}{286} S_{6,3} + \frac{\sqrt{14}}{22} S_{4,3} + \frac{5\sqrt{1365}}{858} S_{6,1} - \frac{2\sqrt{2}}{11} S_{4,1} - \frac{\sqrt{3}}{6} S_{2,1}\right]$$

$$f_{-1} f_3 = N\left[\frac{5\sqrt{2730}}{858} S_{6,-4} - \frac{\sqrt{42}}{22} S_{4,-4} + \frac{5\sqrt{91}}{429} S_{6,-2} - \frac{3\sqrt{6}}{22} S_{4,-2} + \frac{\sqrt{2}}{6} S_{2,-2}\right].$$

$$f_{-1} f_{-3} = -N\left[\frac{5\sqrt{2730}}{858} S_{6,4} - \frac{\sqrt{42}}{22} S_{4,4} + \frac{5\sqrt{91}}{429} S_{6,2} - \frac{3\sqrt{6}}{22} S_{4,2} + \frac{\sqrt{2}}{6} S_{2,2}\right].$$

$$f_2 f_2 = N\left[\frac{5\sqrt{182}}{143} S_{6,4} + \frac{\sqrt{70}}{22} S_{4,4} + \frac{5\sqrt{26}}{143} S_{6,0} - \frac{7\sqrt{2}}{22} S_{4,0} + \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$f_2 f_{-2} = N\left[\frac{5\sqrt{182}}{143} S_{6,-4} + \frac{\sqrt{70}}{22} S_{4,-4}\right].$$

$$f_2 f_3 = N\left[\frac{5\sqrt{6006}}{858} S_{6,5} + \frac{5\sqrt{91}}{858} S_{6,1} - \frac{\sqrt{30}}{22} S_{4,1} + \frac{\sqrt{5}}{6} S_{2,1}\right].$$

$$f_2 f_{-3} = N\left[\frac{5\sqrt{6006}}{858} S_{6,-5} + \frac{5\sqrt{91}}{858} S_{6,-1} - \frac{\sqrt{30}}{22} S_{4,-1} + \frac{\sqrt{5}}{6} S_{2,-1}\right].$$

$$f_{-2} f_{-2} = -N\left[\frac{5\sqrt{182}}{143} S_{6,4} + \frac{\sqrt{70}}{22} S_{4,4} - \frac{5\sqrt{26}}{143} S_{6,0} + \frac{7\sqrt{2}}{22} S_{4,0} - \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$f_{-2} f_3 = N\left[\frac{5\sqrt{6006}}{858} S_{6,-5} - \frac{5\sqrt{91}}{858} S_{6,-1} + \frac{\sqrt{30}}{22} S_{4,-1} - \frac{\sqrt{5}}{6} S_{2,-1}\right].$$

$$f_{-2} f_{-3} = -N\left[\frac{5\sqrt{6006}}{858} S_{6,5} - \frac{5\sqrt{91}}{858} S_{6,1} + \frac{\sqrt{30}}{22} S_{4,1} - \frac{\sqrt{5}}{6} S_{2,1}\right].$$

$$f_3 f_3 = N\left[\frac{5\sqrt{3003}}{429} S_{6,6} - \frac{5\sqrt{26}}{858} S_{6,0} + \frac{3\sqrt{2}}{22} S_{4,0} - \frac{\sqrt{10}}{6} S_{2,0} + \frac{\sqrt{2}}{2} S_{0,0}\right].$$

$$f_3 f_{-3} = N\left[\frac{5\sqrt{3003}}{429} S_{6,-6}\right].$$

$$f_{-3} f_{-3} = -N\left[\frac{5\sqrt{3003}}{429} S_{6,6} + \frac{5\sqrt{26}}{858} S_{6,0} - \frac{3\sqrt{2}}{22} S_{4,0} + \frac{\sqrt{10}}{6} S_{2,0} - \frac{\sqrt{2}}{2} S_{0,0}\right].$$

Tabella III

Valori dei coefficienti della funzione F (u , v)

L L'M	α	β	β'
000	2	2	2
010	$\frac{2\sqrt{3}}{3}$	$\frac{2\sqrt{3}}{3}$	0
020	$\frac{2\sqrt{5}}{5}$	$\frac{2\sqrt{5}}{5}$	0
030	$\frac{2\sqrt{7}}{7}$	$\frac{2\sqrt{7}}{7}$	0
040	$\frac{2}{3}$	$\frac{2}{3}$	0
050	$\frac{2\sqrt{11}}{11}$	$\frac{2\sqrt{11}}{11}$	0
060	$\frac{2\sqrt{13}}{13}$	$\frac{2\sqrt{13}}{13}$	0
110	$\frac{4}{3}$	$-\frac{2}{3}$	$-\frac{2}{3}$
120	$\frac{2\sqrt{15}}{5}$	$-\frac{4\sqrt{15}}{15}$	0
130	$\frac{8\sqrt{21}}{21}$	$-\frac{2\sqrt{21}}{7}$	0
140	$\frac{10\sqrt{3}}{9}$	$-\frac{8\sqrt{3}}{9}$	0
150	$\frac{12\sqrt{33}}{33}$	$-\frac{10\sqrt{33}}{33}$	0
160	$\frac{14\sqrt{39}}{39}$	$-\frac{4\sqrt{39}}{13}$	0

220	$\frac{12}{5}$	$\frac{2}{5}$	$\frac{2}{5}$
230	$\frac{4\sqrt{35}}{7}$	$\frac{6\sqrt{35}}{35}$	0
240	$2\sqrt{5}$	$\frac{4\sqrt{5}}{5}$	0
250	$\frac{42\sqrt{55}}{55}$	$\frac{4\sqrt{55}}{11}$	0
260	$\frac{56\sqrt{65}}{65}$	$\frac{6\sqrt{65}}{13}$	0
330	$\frac{40}{7}$	$-\frac{2}{7}$	$-\frac{2}{7}$
340	$\frac{10\sqrt{7}}{3}$	$-\frac{8\sqrt{7}}{21}$	0
350	$\frac{16\sqrt{77}}{11}$	$-\frac{20\sqrt{77}}{77}$	0
360	$\frac{24\sqrt{91}}{13}$	$-\frac{40\sqrt{91}}{91}$	0
440	$\frac{140}{9}$	$\frac{2}{9}$	$\frac{2}{9}$
450	$\frac{84\sqrt{11}}{11}$	$\frac{10\sqrt{11}}{33}$	0
460	$\frac{140\sqrt{13}}{13}$	$\frac{10\sqrt{13}}{13}$	0
550	$\frac{504}{11}$	$-\frac{2}{11}$	$-\frac{2}{11}$
560	$\frac{84\sqrt{143}}{13}$	$-\frac{12\sqrt{143}}{143}$	0
660	$\frac{1848}{13}$	$\frac{2}{13}$	$\frac{2}{13}$
111	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$

121	$\frac{2\sqrt{5}}{5}$	$\frac{2\sqrt{5}}{5}$	0
131	$\frac{2\sqrt{14}}{7}$	$\frac{2\sqrt{14}}{7}$	0
141	$\frac{2\sqrt{30}}{9}$	$\frac{2\sqrt{30}}{9}$	0
151	$\frac{2\sqrt{55}}{11}$	$\frac{2\sqrt{55}}{11}$	0
161	$\frac{2\sqrt{91}}{13}$	$\frac{2\sqrt{91}}{13}$	0
221	$\frac{8}{5}$	$-\frac{2}{5}$	$-\frac{2}{5}$
231	$\frac{4\sqrt{70}}{14}$	$-\frac{4\sqrt{70}}{35}$	0
241	$\frac{4\sqrt{6}}{3}$	$-\frac{2\sqrt{6}}{3}$	0
251	$\frac{14\sqrt{11}}{11}$	$-\frac{8\sqrt{11}}{11}$	0
261	$\frac{16\sqrt{455}}{65}$	$-\frac{2\sqrt{455}}{13}$	0
331	$\frac{30}{7}$	$\frac{2}{7}$	$\frac{2}{7}$
341	$\frac{2\sqrt{105}}{3}$	$\frac{2\sqrt{105}}{21}$	0
351	$\frac{4\sqrt{770}}{11}$	$\frac{6\sqrt{770}}{77}$	0
361	$\frac{36\sqrt{26}}{13}$	$\frac{10\sqrt{26}}{13}$	0
441	$\frac{112}{9}$	$-\frac{2}{9}$	$-\frac{2}{9}$
451	$\frac{28\sqrt{66}}{11}$	$-\frac{4\sqrt{66}}{33}$	0

461	$\frac{8\sqrt{2730}}{13}$	$-\frac{2\sqrt{2730}}{39}$	0
551	$\frac{420}{11}$	$\frac{2}{11}$	$\frac{2}{11}$
561	$\frac{12\sqrt{5005}}{13}$	$\frac{2\sqrt{5005}}{143}$	0
661	$\frac{1584}{13}$	$-\frac{2}{13}$	$-\frac{2}{13}$
222	$\frac{2}{5}$	$\frac{2}{5}$	$\frac{2}{5}$
232	$\frac{2\sqrt{7}}{7}$	$\frac{2\sqrt{7}}{7}$	0
242	$\frac{2\sqrt{3}}{3}$	$\frac{2\sqrt{3}}{3}$	0
252	$\frac{2\sqrt{77}}{11}$	$\frac{2\sqrt{77}}{11}$	0
262	$\frac{2\sqrt{182}}{13}$	$\frac{2\sqrt{182}}{13}$	0
332	$\frac{12}{7}$	$-\frac{2}{7}$	$-\frac{2}{7}$
342	$\frac{2\sqrt{21}}{3}$	$-\frac{4\sqrt{21}}{21}$	0
352	$\frac{16\sqrt{11}}{11}$	$-\frac{6\sqrt{11}}{11}$	0
362	$\frac{18\sqrt{26}}{13}$	$-\frac{8\sqrt{26}}{13}$	0
442	$\frac{56}{9}$	$\frac{2}{9}$	$\frac{2}{9}$
452	$\frac{8\sqrt{231}}{11}$	$\frac{2\sqrt{231}}{33}$	0
462	$\frac{10\sqrt{546}}{13}$	$\frac{4\sqrt{546}}{39}$	0

552	$\frac{240}{11}$	$-\frac{2}{11}$	$-\frac{2}{11}$
562	$\frac{30\sqrt{286}}{13}$	$-\frac{8\sqrt{286}}{143}$	0
662	$\frac{990}{13}$	$\frac{2}{13}$	$\frac{2}{13}$
333	$\frac{2}{7}$	$\frac{2}{7}$	$\frac{2}{7}$
343	$\frac{2}{3}$	$\frac{2}{3}$	0
353	$\frac{4\sqrt{11}}{11}$	$\frac{4\sqrt{11}}{11}$	0
363	$\frac{4\sqrt{39}}{13}$	$\frac{4\sqrt{39}}{13}$	0
443	$\frac{16}{9}$	$-\frac{2}{9}$	$-\frac{2}{9}$
453	$\frac{12\sqrt{11}}{11}$	$-\frac{8\sqrt{11}}{33}$	0
463	$\frac{40\sqrt{39}}{39}$	$-\frac{4\sqrt{39}}{13}$	0
553	$\frac{90}{11}$	$\frac{2}{11}$	$\frac{2}{11}$
563	$\frac{10\sqrt{429}}{13}$	$\frac{6\sqrt{429}}{143}$	0
663	$\frac{440}{13}$	$-\frac{2}{13}$	$-\frac{2}{13}$
444	$\frac{2}{9}$	$\frac{2}{9}$	$\frac{2}{9}$
454	$\frac{2\sqrt{11}}{11}$	$\frac{2\sqrt{11}}{11}$	0
464	$\frac{2\sqrt{65}}{13}$	$\frac{2\sqrt{65}}{13}$	0

554	$\frac{20}{11}$	$-\frac{2}{11}$	$-\frac{2}{11}$
564	$\frac{2\sqrt{715}}{13}$	$-\frac{4\sqrt{715}}{143}$	0
664	$\frac{132}{13}$	$\frac{2}{13}$	$\frac{2}{13}$
565	$\frac{2\sqrt{13}}{13}$	$\frac{2\sqrt{13}}{13}$	0
665	$\frac{24}{13}$	$-\frac{2}{13}$	$-\frac{2}{13}$
666	$\frac{2}{13}$	$\frac{2}{13}$	$\frac{2}{13}$

Tabella IV

Decomposizione degli integrali coulombiani fra orbitrali **s, p, d** *e* **f** *in integrali elementari*

$$(ss\,|\,ss) = \frac{1}{2}\,J\,(000)$$

$$|\,s\;p_0) = \frac{1}{2}\,J\,(010)$$

$$|\,s\;d_0) = \frac{1}{2}\,J\,(020)$$

$$|\,s\;f_0) = \frac{1}{2}\,J\,(030)$$

$$|\,p_0\,p_0) = \frac{1}{2}\,J\,(000) + \frac{\sqrt{5}}{5}\,J\,(020)$$

$$|\,p_0\,d_0) = \frac{\sqrt{5}}{5}\,J\,(010) + \frac{3\sqrt{105}}{70}\,J\,(030)$$

$$|\,p_0\,f_0) = \frac{3\sqrt{105}}{70}\,J\,(020) + \frac{2\sqrt{21}}{21}\,J\,(040)$$

$$|\,p_1\,p_1) = \frac{1}{2}\,J\,(000) - \frac{\sqrt{5}}{10}\,J\,(020)$$

$$|\,p_1\,d_1) = \frac{\sqrt{15}}{10}\,J\,(010) - \frac{3\sqrt{35}}{70}\,J\,(030)$$

$$|\,p_1\,f_1) = \frac{3\sqrt{70}}{70}\,J\,(020) - \frac{\sqrt{14}}{14}\,J\,(040)$$

$$|\,d_0\,d_0) = \frac{1}{2}\,J\,(000) + \frac{\sqrt{5}}{7}\,J\,(020) + \frac{3}{7}\,J\,(040)$$

$$|\,d_0\,f_0) = \frac{3\sqrt{105}}{70}\,J\,(010) + \frac{2\sqrt{5}}{15}\,J\,(030)$$

$$|\,d_1\,d_1) = \frac{1}{2}\,J\,(000) + \frac{5\sqrt{5}}{70}\,J\,(020) - \frac{2}{7}\,J\,(040)$$

$$|\,d_1\,f_1) = \frac{\sqrt{210}}{35}\,J\,(010) + \frac{\sqrt{10}}{30}\,J\,(030) - \frac{5\sqrt{770}}{462}\,J\,(050)$$

$$| d_2\, d_2) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{7} J\,(020) + \frac{1}{14} J\,(040)$$

$$| d_2\, f_2) = \frac{\sqrt{21}}{14} J\,(010) - \frac{1}{3} J\,(030) + \frac{5\sqrt{77}}{462} J\,(050)$$

$$| f_0\, f_0) = \frac{1}{2} J\,(010) + \frac{2\sqrt{5}}{15} J\,(020) + \frac{3}{11} J\,(040) + \frac{50\sqrt{13}}{429} J\,(060)$$

$$| f_1\, f_1) = \frac{1}{2} J\,(000) + \frac{\sqrt{5}}{10} J\,(020) + \frac{1}{22} J\,(040) - \frac{25\sqrt{13}}{286} J\,(060)$$

$$| f_2\, f_2) = \frac{1}{2} J\,(000) - \frac{7}{22} J\,(040) + \frac{5\sqrt{13}}{143} J\,(060)$$

$$| f_3\, f_3) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{6} J\,(020) + \frac{3}{22} J\,(040) - \frac{5\sqrt{13}}{858} J\,(060)$$

$$(s\, p_0 | s\; p_0) = \frac{1}{2} J\,(110)$$

$$| s\; d_0) = \frac{1}{2} J\,(120)$$

$$| s\; f_0) = \frac{1}{2} J\,(130)$$

$$| p_0\, p_0) = \frac{1}{2} J\,(010) + \frac{\sqrt{5}}{5} J\,(120)$$

$$| p_0\, d_0) = \frac{\sqrt{5}}{5} J\,(110) + \frac{3\sqrt{105}}{70} J\,(130)$$

$$| p_0\, f_0) = \frac{3\sqrt{105}}{70} J\,(120) + \frac{2\sqrt{21}}{21} J\,(140)$$

$$| p_1\, p_1) = \frac{1}{2} J\,(010) - \frac{\sqrt{5}}{10} J\,(120)$$

$$| p_1\, d_1) = \frac{\sqrt{15}}{10} J\,(110) - \frac{3\sqrt{35}}{70} J\,(130)$$

$$| p_1\, f_1) = \frac{3\sqrt{70}}{70} J\,(120) - \frac{\sqrt{14}}{14} J\,(140)$$

$$| d_0\, d_0) = \frac{1}{2} J\,(010) + \frac{\sqrt{5}}{7} J\,(120) + \frac{3}{7} J\,(140)$$

$$| d_0 f_0) = \frac{3\sqrt{105}}{70} J(110) + \frac{2\sqrt{5}}{15} J(130)$$

$$| d_1 d_1) = \frac{1}{2} J(010) + \frac{\sqrt{5}}{14} J(120) - \frac{2}{7} J(140)$$

$$| d_1 f_1) = \frac{\sqrt{210}}{35} J(110) + \frac{\sqrt{10}}{30} J(130) - \frac{5\sqrt{770}}{462} J(150)$$

$$| d_2 d_2) = \frac{1}{2} J(010) - \frac{\sqrt{5}}{7} J(120) + \frac{1}{14} J(140)$$

$$| d_2 f_2) = \frac{\sqrt{21}}{14} J(110) - \frac{1}{3} J(130) + \frac{5\sqrt{77}}{462} J(150)$$

$$| f_0 f_0) = \frac{1}{2} J(010) + \frac{2\sqrt{5}}{15} J(120) + \frac{3}{11} J(140) + \frac{50\sqrt{13}}{429} J(160)$$

$$| f_1 f_1) = \frac{1}{2} J(010) + \frac{\sqrt{5}}{10} J(120) + \frac{1}{22} J(140) - \frac{25\sqrt{13}}{286} J(160)$$

$$| f_2 f_2) = \frac{1}{2} J(010) - \frac{7}{22} J(140) + \frac{5\sqrt{13}}{143} J(160)$$

$$| f_3 f_3) = \frac{1}{2} J(010) - \frac{\sqrt{5}}{6} J(120) + \frac{3}{22} J(140) - \frac{5\sqrt{13}}{858} J(160)$$

$$(s\, p_1 | s\, p_1) = \frac{1}{2} J(111)$$

$$| s\, d_1) = \frac{1}{2} J(121)$$

$$| s\, f_1) = \frac{1}{2} J(131)$$

$$| p_0 p_1) = \frac{\sqrt{15}}{10} J(121)$$

$$| p_0 d_1) = \frac{\sqrt{15}}{10} J(111) + \frac{\sqrt{210}}{35} J(131)$$

$$| p_0 f_1) = \frac{\sqrt{210}}{35} J(121) + \frac{\sqrt{35}}{14} J(141)$$

$$| p_1 d_0) = -\frac{\sqrt{5}}{10} J(111) + \frac{3\sqrt{70}}{70} J(131)$$

$$p_1\, d_2) = \frac{\sqrt{15}}{10}\, J\,(111) - \frac{\sqrt{210}}{140}\, J\,(131)$$

$$|\, p_1\, f_0) = - \frac{3\sqrt{35}}{70}\, J\,(121) + \frac{\sqrt{210}}{42}\, J\,(141)$$

$$|\, p_1\, f_2) = \frac{\sqrt{21}}{14}\, J\,(121) - \frac{\sqrt{14}}{28}\, J\,(141)$$

$$|\, d_0\, d_1) = \frac{\sqrt{5}}{14}\, J\,(121) + \frac{\sqrt{30}}{14}\, J\,(141)$$

$$|\, d_0\, f_1) = \frac{3\sqrt{70}}{70}\, J\,(111) + \frac{\sqrt{5}}{10}\, J\,(131) + \frac{5\sqrt{154}}{154}\, J\,(151)$$

$$|\, d_1\, d_2) = \frac{\sqrt{15}}{14}\, J\,(121) - \frac{\sqrt{10}}{28}\, J\,(141)$$

$$|\, d_1\, f_0) = - \frac{3\sqrt{35}}{70}\, J\,(111) + \frac{\sqrt{10}}{30}\, J\,(131) + \frac{10\sqrt{77}}{231}\, J\,(151)$$

$$|\, d_1\, f_2) = \frac{\sqrt{21}}{14}\, J\,(111) + \frac{\sqrt{6}}{12}\, J\,(131) - \frac{\sqrt{1155}}{231}\, J\,(151)$$

$$|\, d_2\, f_1) = - \frac{\sqrt{210}}{140}\, J\,(111) + \frac{\sqrt{15}}{15}\, J\,(131) - \frac{5\sqrt{462}}{924}\, J\,(151)$$

$$|\, d_2\, f_3) = \frac{3\sqrt{14}}{28}\, J\,(111) - \frac{1}{6}\, J\,(131) + \frac{\sqrt{770}}{924}\, J\,(151)$$

$$|\, f_0\, f_1) = \frac{\sqrt{10}}{30}\, J\,(121) + \frac{\sqrt{15}}{22}\, J\,(141) + \frac{25\sqrt{182}}{936}\, J\,(161)$$

$$|\, f_1\, f_2) = \frac{\sqrt{6}}{12}\, J\,(121) + \frac{2}{11}\, J\,(141) - \frac{5\sqrt{2730}}{1716}\, J\,(161)$$

$$|\, f_2\, f_3) = \frac{\sqrt{10}}{12}\, J\,(121) - \frac{\sqrt{15}}{22}\, J\,(141) + \frac{5\sqrt{182}}{1716}\, J\,(161)$$

$$(s\, d_0\, |\, s\, d_0) = \frac{1}{2}\, J\,(220)$$

$$|\, s\, f_0) = \frac{1}{2}\, J\,(230)$$

$$|\, p_0\, p_0) = \frac{1}{2}\, J\,(020) + \frac{\sqrt{5}}{5}\, J\,(220)$$

$$| p_0 d_0) = \frac{\sqrt{5}}{5} J(120) + \frac{3\sqrt{105}}{70} J(230)$$

$$| p_0 f_0) = \frac{3\sqrt{105}}{70} J(220) + \frac{2\sqrt{21}}{21} J(240)$$

$$| p_1 p_1) = \frac{1}{2} J(020) - \frac{\sqrt{5}}{10} J(220)$$

$$| p_1 d_1) = \frac{\sqrt{15}}{10} J(120) - \frac{3\sqrt{35}}{70} J(230)$$

$$| p_1 f_1) = \frac{3\sqrt{70}}{70} J(220) - \frac{\sqrt{14}}{14} J(240)$$

$$| d_0 d_0) = \frac{1}{2} J(020) + \frac{\sqrt{5}}{7} J(220) + \frac{3}{7} J(240)$$

$$| d_0 f_0) = \frac{3\sqrt{105}}{70} J(120) + \frac{2\sqrt{5}}{15} J(230)$$

$$| d_1 d_1) = \frac{1}{2} J(020) + \frac{5\sqrt{5}}{70} J(220) - \frac{2}{7} J(240)$$

$$| d_1 f_1) = \frac{\sqrt{210}}{35} J(120) + \frac{\sqrt{10}}{30} J(230) - \frac{5\sqrt{770}}{462} J(250)$$

$$| d_2 d_2) = \frac{1}{2} J(020) - \frac{\sqrt{5}}{7} J(220) + \frac{1}{14} J(240)$$

$$| d_2 f_2) = \frac{\sqrt{21}}{14} J(120) - \frac{1}{3} J(230) + \frac{5\sqrt{77}}{462} J(250)$$

$$| f_0 f_0) = \frac{1}{2} J(020) + \frac{2\sqrt{5}}{15} J(220) + \frac{3}{11} J(240) + \frac{50\sqrt{13}}{429} J(260)$$

$$| f_1 f_1) = \frac{1}{2} J(020) + \frac{\sqrt{5}}{10} J(220) + \frac{1}{22} J(240) - \frac{25\sqrt{13}}{286} J(260)$$

$$| f_2 f_2) = \frac{1}{2} J(020) - \frac{7}{22} J(240) + \frac{5\sqrt{13}}{143} J(260)$$

$$| f_3 f_3) = \frac{1}{2} J(020) - \frac{\sqrt{5}}{6} J(220) + \frac{3}{22} J(240) - \frac{5\sqrt{13}}{858} J(260)$$

$$(s\, d_1 | s\, d_1) = \frac{1}{2} J(221)$$

$$|s\ f_1) = \frac{1}{2}\ J\ (231)$$

$$|p_0\ p_1) = \frac{\sqrt{15}}{10}\ J\ (221)$$

$$|p_0\ d_1) = \frac{\sqrt{15}}{10}\ J\ (121) + \frac{\sqrt{210}}{35}\ J\ (231)$$

$$|p_0\ f_1) = \frac{\sqrt{210}}{35}\ J\ (221) + \frac{\sqrt{35}}{14}\ J\ (241)$$

$$|p_1\ d_0) = -\frac{\sqrt{5}}{10}\ J\ (121) + \frac{3\sqrt{70}}{70}\ J\ (231)$$

$$|p_1\ d_2) = \frac{\sqrt{15}}{10}\ J\ (121) - \frac{\sqrt{210}}{140}\ J\ (231)$$

$$|p_1\ f_0) = -\frac{3\sqrt{35}}{70}\ J\ (221) + \frac{\sqrt{210}}{42}\ J\ (241)$$

$$|p_1\ f_2) = \frac{\sqrt{21}}{14}\ J\ (221) - \frac{\sqrt{14}}{28}\ J\ (241)$$

$$|d_0 d_1) = \frac{\sqrt{5}}{14}\ J\ (221) + \frac{\sqrt{30}}{14}\ J\ (241)$$

$$|d_0\ f_1) = \frac{3\sqrt{70}}{70}\ J\ (121) + \frac{\sqrt{5}}{10}\ J\ (231) + \frac{5\sqrt{154}}{154}\ J\ (251)$$

$$|d_1\ d_2) = \frac{\sqrt{15}}{14}\ J\ (221) - \frac{\sqrt{10}}{28}\ J\ (241)$$

$$|d_1\ f_0) = -\frac{3\sqrt{35}}{70}\ J\ (121) + \frac{\sqrt{10}}{30}\ J\ (231) + \frac{10\sqrt{77}}{231}\ J\ (251)$$

$$|d_1\ f_2) = \frac{\sqrt{21}}{14}\ J\ (121) + \frac{\sqrt{6}}{12}\ J\ (231) - \frac{\sqrt{1155}}{231}\ J\ (251)$$

$$|d_2\ f_1) = -\frac{\sqrt{210}}{140}\ J\ (121) + \frac{\sqrt{15}}{15}\ J\ (231) - \frac{5\sqrt{462}}{924}\ J\ (251)$$

$$|d_2\ f_2) = \frac{3\sqrt{14}}{28}\ J\ (121) - \frac{1}{6}\ J\ (231) + \frac{\sqrt{770}}{924}\ J\ (251)$$

$$|f_0\ f_1) = \frac{\sqrt{10}}{30}\ J\ (221) + \frac{\sqrt{15}}{22}\ J\ (241) + \frac{25\sqrt{182}}{936}\ J\ (261)$$

$$| f_1\, f_2) = \frac{\sqrt{6}}{12}\, J\,(221) + \frac{2}{11}\, J\,(241) - \frac{5\sqrt{2730}}{1716}\, J\,(261)$$

$$| f_2\, f_3) = \frac{\sqrt{10}}{12}\, J\,(221) - \frac{\sqrt{15}}{22}\, J\,(241) + \frac{5\sqrt{182}}{1716}\, J\,(261)$$

$$(s\, d_2 | s\, d_2) = \frac{1}{2}\, J\,(222)$$

$$| s\, f_2) = \frac{1}{2}\, J\,(232)$$

$$| p_0\, d_2) = \frac{\sqrt{21}}{14}\, J\,(232)$$

$$| p_0\, f_2) = \frac{\sqrt{21}}{14}\, J\,(232) + \frac{\sqrt{7}}{7}\, J\,(242)$$

$$| p_1\, p_1) = \frac{\sqrt{15}}{10}\, J\,(222)$$

$$| p_1\, d_1) = \frac{\sqrt{21}}{14}\, J\,(232)$$

$$| p_1\, f_1) = \frac{\sqrt{70}}{28}\, J\,(242) - \frac{\sqrt{210}}{140}\, J\,(222)$$

$$| p_1\, f_3) = \frac{3\sqrt{14}}{28}\, J\,(222) - \frac{\sqrt{42}}{84}\, J\,(242)$$

$$| d_0\, d_2) = -\frac{\sqrt{5}}{7}\, J\,(222) + \frac{\sqrt{15}}{14}\, J\,(242)$$

$$| d_0\, f_2) = \frac{\sqrt{55}}{22}\, J\,(252)$$

$$| d_1\, d_1) = \frac{\sqrt{15}}{14}\, J\,(222) + \frac{\sqrt{5}}{7}\, J\,(242)$$

$$| d_1\, f_1) = \frac{\sqrt{6}}{12}\, J\,(232) + \frac{5\sqrt{66}}{132}\, J\,(252)$$

$$| d_1\, f_3) = \frac{\sqrt{10}}{12}\, J\,(232) - \frac{\sqrt{110}}{132}\, J\,(252)$$

$$| d_2\, f_0) = -\frac{1}{3}\, J\,(232) + \frac{5\sqrt{11}}{66}\, J\,(252)$$

$$|\,f_0\, f_2) = -\frac{1}{3}\,J\,(222) - \frac{\sqrt{3}}{22}\,J\,(242) + \frac{\sqrt{182}}{39}\,J\,(262)$$

$$|\,f_1\, f_1) = \frac{\sqrt{15}}{15}\,J\,(222) + \frac{\sqrt{5}}{11}\,J\,(242) + \frac{5\sqrt{2730}}{858}\,J\,(262)$$

$$|\,f_1\, f_2) = -\frac{1}{6}\,J\,(222) + \frac{3\sqrt{3}}{22}\,J\,(242) - \frac{5\sqrt{182}}{858}\,J\,(262)$$

$$(s\, f_0)\,|\,s\, f_0) = \frac{1}{2}\,J\,(330)$$

$$|\,p_0\, p_0) = \frac{1}{2}\,J\,(030) + \frac{\sqrt{5}}{5}\,J\,(230)$$

$$|\,p_0\, d_0 = \frac{\sqrt{5}}{5}\,J\,(130) + \frac{3\sqrt{105}}{70}\,J\,(330)$$

$$|\,p_0\, f_0) = \frac{3\sqrt{105}}{70}\,J\,(230) + \frac{2\sqrt{21}}{21}\,J\,(340)$$

$$|\,p_1\, p_1) = \frac{1}{2}\,J\,(030) - \frac{\sqrt{5}}{10}\,J\,(230)$$

$$|\,p_1\, d_1) = \frac{\sqrt{15}}{10}\,J\,(130) - \frac{3\sqrt{35}}{70}\,J\,(330)$$

$$|\,p_1\, f_1) = \frac{3\sqrt{70}}{70}\,J\,(230) - \frac{\sqrt{14}}{14}\,J\,(340)$$

$$|\,d_0\, d_0) = \frac{1}{2}\,J\,(030) + \frac{\sqrt{5}}{7}\,J\,(230) + \frac{3}{7}\,J\,(340)$$

$$|\,d_0\, f_0) = \frac{3\sqrt{105}}{70}\,J\,(130) + \frac{2\sqrt{5}}{15}\,J\,(330)$$

$$|\,d_1\, d_1) = \frac{1}{2}\,J\,(030) + \frac{\sqrt{5}}{14}\,J\,(230) - \frac{2}{7}\,J\,(340)$$

$$|\,d_1\, f_1) = \frac{\sqrt{210}}{35}\,J\,(130) + \frac{\sqrt{10}}{30}\,J\,(330) - \frac{5\sqrt{770}}{462}\,J\,(350)$$

$$|\,d_2\, d_2) = \frac{1}{2}\,J\,(030) - \frac{\sqrt{5}}{7}\,J\,(230) + \frac{1}{14}\,J\,(340)$$

$$|\,d_2\, f_2) = \frac{\sqrt{21}}{14}\,J\,(130) - \frac{1}{3}\,J\,(330) + \frac{5\sqrt{77}}{462}\,J\,(350)$$

$$|f_0\, f_0) = \frac{1}{2}\,J\,(030) + \frac{2\sqrt{5}}{15}\,J\,(230) + \frac{3}{11}\,J\,(340) + \frac{50\sqrt{13}}{429}\,J\,(360)$$

$$|f_1\, f_1) = \frac{1}{2}\,J\,(030) + \frac{\sqrt{5}}{10}\,J\,(230) + \frac{1}{22}\,J\,(340) - \frac{25\sqrt{13}}{286}\,J\,(360)$$

$$|f_2\, f_2) = \frac{1}{2}\,J\,(030) - \frac{7}{22}\,J\,(340) + \frac{5\sqrt{13}}{143}\,J\,(360)$$

$$|f_3\, f_3) = \frac{1}{2}\,J\,(030) - \frac{\sqrt{5}}{6}\,J\,(230) + \frac{3}{22}\,J\,(340) - \frac{5\sqrt{13}}{858}\,J\,(360) \quad .$$

$$(s\, f_1\,|\, s\, f_1) = \frac{1}{2}\,J\,(331)$$

$$|p_0\, p_1) = \frac{\sqrt{15}}{10}\,J\,(231)$$

$$|p_0\, d_1) = \frac{\sqrt{15}}{10}\,J\,(131) + \frac{\sqrt{210}}{35}\,J\,(331)$$

$$|p_0\, f_1) = \frac{\sqrt{210}}{35}\,J\,(231) + \frac{\sqrt{35}}{14}\,J\,(341)$$

$$|p_1\, d_0) = -\frac{\sqrt{5}}{10}\,J\,(131) + \frac{3\sqrt{70}}{70}\,J\,(331)$$

$$|p_1\, d_2) = \frac{\sqrt{15}}{10}\,J\,(131) - \frac{\sqrt{210}}{140}\,J\,(331)$$

$$|p_1\, f_0) = -\frac{3\sqrt{35}}{70}\,J\,(231) + \frac{\sqrt{210}}{42}\,J\,(341)$$

$$|p_1\, f_2) = \frac{\sqrt{21}}{14}\,J\,(231) - \frac{\sqrt{14}}{28}\,J\,(341)$$

$$|d_0\, d_1) = \frac{\sqrt{5}}{14}\,J\,(231) + \frac{\sqrt{30}}{14}\,J\,(341)$$

$$|d_0\, f_1) = \frac{3\sqrt{70}}{70}\,J\,(131) + \frac{\sqrt{5}}{10}\,J\,(331) + \frac{5\sqrt{154}}{154}\,J\,(351)$$

$$|d_1\, d_2) = \frac{\sqrt{15}}{14}\,J\,(231) - \frac{\sqrt{10}}{28}\,J\,(341)$$

$$|d_1\, f_0) = -\frac{3\sqrt{35}}{70}\,J\,(131) + \frac{\sqrt{10}}{30}\,J\,(331) + \frac{10\sqrt{77}}{231}\,J\,(351)$$

$$\left| d_1\, f_2 \right) = \frac{\sqrt{21}}{14}\, J\,(131) + \frac{\sqrt{6}}{12}\, J\,(331) - \frac{\sqrt{1155}}{231}\, J\,(351)$$

$$\left| d_2\, f_1 \right) = -\frac{\sqrt{210}}{140}\, J\,(131) + \frac{\sqrt{15}}{15}\, J\,(331) - \frac{5\sqrt{462}}{924}\, J\,(351)$$

$$\left| d_2\, f_2 \right) = \frac{3\sqrt{14}}{28}\, J\,(131) - \frac{1}{6}\, J\,(331) + \frac{\sqrt{770}}{924}\, J\,(351)$$

$$\left| f_0\, f_1 \right) = \frac{\sqrt{10}}{30}\, J\,(231) + \frac{\sqrt{15}}{22}\, J\,(341) + \frac{25\sqrt{182}}{936}\, J\,(361)$$

$$\left| f_1\, f_2 \right) = \frac{\sqrt{6}}{12}\, J\,(231) + \frac{2}{11}\, J\,(341) - \frac{5\sqrt{2730}}{1716}\, J\,(361)$$

$$\left| f_2\, f_2 \right) = \frac{\sqrt{10}}{12}\, J\,(231) - \frac{\sqrt{15}}{22}\, J\,(341) + \frac{5\sqrt{182}}{1716}\, J\,(361)$$

$$(s\, f_2 \left| s\, f_2 \right) = \frac{1}{2}\, J\,(332)$$

$$\left| p_0\, d_2 \right) = \frac{\sqrt{21}}{14}\, J\,(332)$$

$$\left| p_0\, f_2 \right) = \frac{\sqrt{21}}{14}\, J\,(232) + \frac{\sqrt{7}}{7}\, J\,(342)$$

$$\left| p_1\, p_1 \right) = \frac{\sqrt{15}}{10}\, J\,(232)$$

$$\left| p_1\, d_1 \right) = \frac{\sqrt{21}}{14}\, J\,(332)$$

$$\left| p_1\, f_1 \right) = -\frac{\sqrt{210}}{140}\, J\,(232) + \frac{\sqrt{70}}{28}\, J\,(342)$$

$$\left| p_1\, f_2 \right) = \frac{3\sqrt{14}}{28}\, J\,(232) - \frac{\sqrt{42}}{84}\, J\,(342)$$

$$\left| d_0\, d_2 \right) = -\frac{\sqrt{5}}{7}\, J\,(232) + \frac{\sqrt{15}}{14}\, J\,(342)$$

$$\left| d_0\, f_2 \right) = \frac{\sqrt{55}}{22}\, J\,(352)$$

$$\left| d_1\, d_1 \right) = \frac{\sqrt{15}}{14}\, J\,(232) + \frac{\sqrt{5}}{7}\, J\,(342)$$

$$| d_1 f_1) = \frac{\sqrt{6}}{12} J(332) + \frac{5\sqrt{66}}{132} J(352)$$

$$| d_1 f_3) = \frac{\sqrt{10}}{12} J(332) - \frac{\sqrt{110}}{132} J(352)$$

$$| d_2 f_0) = -\frac{1}{3} J(332) + \frac{5\sqrt{11}}{66} J(352)$$

$$| f_0 f_2) = -\frac{1}{3} J(232) - \frac{\sqrt{3}}{22} J(342) + \frac{\sqrt{182}}{39} J(362)$$

$$| f_1 f_1) = \frac{\sqrt{15}}{15} J(232) + \frac{\sqrt{5}}{11} J(342) + \frac{5\sqrt{2730}}{858} J(362)$$

$$| f_1 f_3) = -\frac{1}{6} J(232) + \frac{3\sqrt{3}}{22} J(342) - \frac{5\sqrt{182}}{858} J(362)$$

$$(s\, f_3 | s\, f_3) = \frac{1}{2} J(333)$$

$$| p_0 f_3) = \frac{\sqrt{3}}{6} J(343)$$

$$| p_1 d_2) = \frac{3\sqrt{14}}{28} J(333)$$

$$| p_1 f_2) = \frac{\sqrt{2}}{4} J(343)$$

$$| d_0 f_3) = -\frac{\sqrt{5}}{6} J(333) + \frac{\sqrt{55}}{33} J(353)$$

$$| d_1 d_2) = \frac{\sqrt{70}}{28} J(343)$$

$$| d_1 f_2) = \frac{\sqrt{10}}{12} J(333) + \frac{\sqrt{110}}{33} J(353)$$

$$| d_2 f_1) = -\frac{1}{6} J(333) + \frac{5\sqrt{11}}{66} J(353)$$

$$| f_0 f_3) = -\frac{3\sqrt{7}}{22} J(343) + \frac{5\sqrt{273}}{429} J(363)$$

$$| f_1 f_2) = \frac{\sqrt{7}}{22} J(343) + \frac{5\sqrt{273}}{286} J(363)$$

$$(p_0 p_0 | p_0 p_0) = \frac{1}{2} J(000) + \frac{2\sqrt{5}}{5} J(020) + \frac{2}{5} J(220)$$

$$| p_0 d_0) = \frac{\sqrt{5}}{5} J(010) + \frac{3\sqrt{105}}{70} J(030) + \frac{2}{5} J(120) + \frac{3\sqrt{21}}{35} J(230)$$

$$| p_0 f_0) = \frac{4\sqrt{105}}{105} J(240) + \frac{3\sqrt{21}}{35} J(220) + \frac{2\sqrt{21}}{21} J(040) + \frac{3\sqrt{105}}{70} J(020)$$

$$| p_1 p_1) = \frac{1}{2} J(000) + \frac{\sqrt{5}}{10} J(020) - \frac{1}{5} J(220)$$

$$| p_1 d_1) = \frac{\sqrt{15}}{10} J(010) - \frac{3\sqrt{35}}{70} J(030) + \frac{\sqrt{3}}{5} J(120) - \frac{3\sqrt{7}}{35} J(230)$$

$$| p_1 f_1) = -\frac{\sqrt{70}}{35} J(240) + \frac{3\sqrt{14}}{35} J(220) - \frac{\sqrt{14}}{14} J(040) + \frac{3\sqrt{70}}{70} J(020)$$

$$| d_0 d_0) = \frac{1}{2} J(000) + \frac{12\sqrt{5}}{35} J(020) + \frac{3}{7} J(040) + \frac{2}{7} J(220) + \frac{6\sqrt{5}}{35} J(240)$$

$$| d_0 f_0) = \frac{10\sqrt{77}}{231} J(250) + \frac{4}{15} J(230) + \frac{3\sqrt{21}}{35} J(120) + \frac{5\sqrt{385}}{231} J(050) +$$

$$+ \frac{2\sqrt{5}}{15} J(030) + \frac{3\sqrt{105}}{70} J(010)$$

$$| d_1 d_1) = \frac{1}{2} J(000) + \frac{19\sqrt{5}}{70} J(020) - \frac{2}{7} J(040) + \frac{1}{7} J(220) - \frac{4\sqrt{5}}{35} J(240)$$

$$| d_1 f_1) = -\frac{5\sqrt{154}}{231} J(250) + \frac{\sqrt{2}}{15} J(230) + \frac{2\sqrt{42}}{35} J(120) - \frac{5\sqrt{770}}{462} J(050) +$$

$$+ \frac{\sqrt{10}}{30} J(030) + \frac{\sqrt{210}}{35} J(010)$$

$$| d_2 d_2) = \frac{1}{2} J(000) + \frac{2\sqrt{5}}{35} J(020) - \frac{2}{7} J(220) + \frac{\sqrt{5}}{35} J(240) + \frac{1}{14} J(040)$$

$$| d_2 f_2) = \frac{\sqrt{385}}{231} J(250) - \frac{2\sqrt{5}}{15} J(230) + \frac{\sqrt{105}}{35} J(120) + \frac{5\sqrt{77}}{462} J(050) -$$

$$- \frac{1}{3} J(030) + \frac{\sqrt{21}}{14} J(010)$$

$$| f_0 f_0) = \frac{20\sqrt{65}}{429} J(260) + \frac{6\sqrt{5}}{55} J(240) + \frac{4}{15} J(220) + \frac{\sqrt{5}}{3} J(020) +$$

$$+ \frac{50\sqrt{13}}{429} J(060) + \frac{3}{11} J(040) + \frac{1}{2} J(000)$$

$$|\, f_1 f_1) = -\frac{5\sqrt{65}}{143} J(260) + \frac{\sqrt{5}}{55} J(240) + \frac{1}{5} J(220) + \frac{3\sqrt{5}}{10} J(020) -$$

$$- \frac{25\sqrt{13}}{286} J(060) + \frac{1}{22} J(040) + \frac{1}{2} J(000)$$

$$|\, f_2 f_2) = \frac{2\sqrt{65}}{143} J(260) - \frac{7\sqrt{5}}{55} J(240) + \frac{\sqrt{5}}{5} J(020) + \frac{5\sqrt{13}}{143} J(060) -$$

$$- \frac{7}{22} J(040) + \frac{1}{2} J(000)$$

$$|\, f_3 f_3) = -\frac{\sqrt{65}}{429} J(260) + \frac{3\sqrt{5}}{55} J(240) - \frac{1}{3} J(220) + \frac{\sqrt{5}}{30} J(020) -$$

$$- \frac{5\sqrt{13}}{858} J(060) + \frac{3}{22} J(040) + \frac{1}{2} J(000)$$

$$(p_0 p_1 |\, p_0 p_1) = \frac{3}{10} J(221)$$

$$|\, p_0 d_1) = \frac{3}{10} J(121) + \frac{3\sqrt{14}}{35} J(231)$$

$$|\, p_0 f_1) = \frac{\sqrt{21}}{14} J(241) + \frac{3\sqrt{14}}{35} J(221)$$

$$|\, p_1 d_0) = -\frac{\sqrt{3}}{10} J(121) + \frac{3\sqrt{42}}{70} J(231)$$

$$|\, p_1 d_2) = \frac{3}{10} J(121) - \frac{3\sqrt{14}}{140} J(231)$$

$$|\, p_1 f_0) = \frac{\sqrt{14}}{14} J(241) - \frac{3\sqrt{21}}{70} J(221)$$

$$|\, p_1 f_2) = -\frac{\sqrt{210}}{140} J(241) + \frac{3\sqrt{35}}{70} J(221)$$

$$|\, d_0 d_1) = \frac{\sqrt{3}}{14} J(221) + \frac{3\sqrt{2}}{14} J(241)$$

$$|\, d_0 f_1) = \frac{\sqrt{2310}}{154} J(251) + \frac{\sqrt{3}}{10} J(231) + \frac{3\sqrt{42}}{70} J(121)$$

$$|\, d_1 d_2) = \frac{3}{14} J(221) - \frac{\sqrt{6}}{28} J(241)$$

$$|d_1 f_0) = \frac{2\sqrt{1155}}{231} J(251) + \frac{\sqrt{6}}{30} J(231) - \frac{3\sqrt{21}}{70} J(121)$$

$$|d_1 f_2) = -\frac{\sqrt{77}}{77} J(251) + \frac{\sqrt{10}}{20} J(231) + \frac{3\sqrt{35}}{70} J(121)$$

$$|d_2 f_1) = -\frac{\sqrt{770}}{308} J(251) + \frac{1}{5} J(231) - \frac{3\sqrt{14}}{140} J(121)$$

$$|d_2 f_3) = \frac{\sqrt{462}}{924} J(251) - \frac{\sqrt{15}}{30} J(231) + \frac{3\sqrt{210}}{140} J(121)$$

$$|f_0 f_1) = \frac{5\sqrt{2730}}{936} J(261) + \frac{3}{22} J(241) + \frac{\sqrt{6}}{30} J(221)$$

$$|f_1 f_2) = -\frac{5\sqrt{182}}{572} J(261) + \frac{2\sqrt{15}}{55} J(241) + \frac{\sqrt{10}}{20} J(221)$$

$$|f_2 f_3) = \frac{\sqrt{2730}}{1716} J(261) - \frac{3}{22} J(241) + \frac{\sqrt{6}}{12} J(221)$$

$$(p_0 d_0|\, p_0 d_0) = \frac{2}{5} J(110) + \frac{6\sqrt{21}}{35} J(130) + \frac{27}{70} J(330)$$

$$|p_0 f_0) = \frac{6\sqrt{5}}{35} J(340) + \frac{27}{70} J(230) + \frac{4\sqrt{105}}{105} J(140) + \frac{3\sqrt{21}}{35} J(120)$$

$$|p_1 p_1) = \frac{\sqrt{5}}{5} J(010) - \frac{3\sqrt{105}}{70} J(030) - \frac{1}{5} J(120) - \frac{3\sqrt{21}}{70} J(230)$$

$$|p_1 d_1) = \frac{\sqrt{3}}{5} J(110) + \frac{3\sqrt{7}}{70} J(130) - \frac{9\sqrt{3}}{70} J(330)$$

$$|p_1 f_1) = -\frac{3\sqrt{30}}{70} J(340) + \frac{9\sqrt{6}}{70} J(230) - \frac{\sqrt{70}}{35} J(140) + \frac{3\sqrt{14}}{35} J(120)$$

$$|d_0 d_0) = \frac{\sqrt{5}}{5} J(010) + \frac{3\sqrt{105}}{70} J(030) + \frac{2}{7} J(120) + \frac{6\sqrt{5}}{35} J\,140 +$$
$$+ \frac{3\sqrt{21}}{49} J(230) + \frac{9\sqrt{105}}{245} J(340)$$

$$|d_0 f_0) = \frac{5\sqrt{33}}{77} J(350) + \frac{2\sqrt{21}}{35} J(330) + \frac{137}{210} J(130) + \frac{10\sqrt{77}}{231} J(150) + \frac{3\sqrt{21}}{35} J(110)$$

$$|d_1 d_1) = \frac{\sqrt{5}}{5} J(010) + \frac{3\sqrt{105}}{70} J(030) + \frac{1}{7} J(120) - \frac{4\sqrt{5}}{35} J(140) +$$
$$+ \frac{3\sqrt{21}}{98} J(230) - \frac{6\sqrt{105}}{245} J(340)$$

$$| d_1 f_1) = -\frac{5\sqrt{66}}{154} J\,(350) + \frac{\sqrt{42}}{70} J\,(330) + \frac{34\sqrt{2}}{105} J\,(130) - \frac{5\sqrt{154}}{231} J\,(150) + \frac{2\sqrt{42}}{35} J\,(110)$$

$$| d_2 d_2) = \frac{\sqrt{5}}{5} J\,(010) + \frac{3\sqrt{105}}{70} J\,(030) - \frac{2}{7} J\,(120) + \frac{\sqrt{5}}{35} J\,(140) - \frac{3\sqrt{21}}{49} J\,(230) + \frac{3\sqrt{105}}{490} J\,(340)$$

$$| d_2 f_2) = \frac{\sqrt{105}}{35} J\,(110) - \frac{\sqrt{5}}{210} J\,(130) + \frac{\sqrt{385}}{231} J\,(150) - \frac{\sqrt{105}}{35} J\,(330) + \frac{\sqrt{165}}{154} J\,(350)$$

$$| f_0 f_0) = \frac{\sqrt{5}}{5} J\,(010) + \frac{3\sqrt{105}}{70} J\,(030) + \frac{4}{15} J\,(120) + \frac{6\sqrt{5}}{55} J\,(140) + \frac{20\sqrt{65}}{429} J\,(160) + \frac{2\sqrt{21}}{35} J\,(230) + \frac{9\sqrt{105}}{385} J\,(340) + \frac{10\sqrt{1365}}{1001} J\,(360)$$

$$| f_1 f_1) = \frac{\sqrt{5}}{5} J\,(010) + \frac{3\sqrt{105}}{70} J\,(030) + \frac{1}{5} J\,(120) + \frac{\sqrt{5}}{55} J\,(140) - \frac{5\sqrt{65}}{143} J\,(160) + \frac{3\sqrt{21}}{70} J\,(230) + \frac{3\sqrt{105}}{770} J\,(340) - \frac{15\sqrt{1365}}{2002} J\,(360)$$

$$| f_2 f_2) = \frac{\sqrt{5}}{5} J\,(010) + \frac{3\sqrt{105}}{70} J\,(030) - \frac{7\sqrt{5}}{55} J\,(140) + \frac{2\sqrt{65}}{143} J\,(160) - \frac{3\sqrt{105}}{110} J\,(340) + \frac{3\sqrt{1365}}{1001} J\,(360)$$

$$| f_3 f_3) = \frac{\sqrt{5}}{5} J\,(010) + \frac{3\sqrt{105}}{70} J\,(030) - \frac{1}{3} J\,(120) + \frac{3\sqrt{5}}{55} J\,(140) - \frac{\sqrt{65}}{429} J\,(160) - \frac{\sqrt{21}}{14} J\,(230) + \frac{9\sqrt{105}}{770} J\,(340) - \frac{\sqrt{1365}}{2002} J\,(360)$$

$$(p_0 d_1 | p_0 d_1) = \frac{3}{10} J\,(111) + \frac{3\sqrt{14}}{35} J\,(131) + \frac{12}{35} J\,(331)$$

$$| p_0 f_1) = \frac{3\sqrt{14}}{35} J\,(121) + \frac{\sqrt{21}}{14} J\,(141) + \frac{12}{35} J\,(231) + \frac{\sqrt{6}}{7} J\,(341)$$

$$| p_1 d_0) = -\frac{\sqrt{3}}{10} J\,(111) + \frac{\sqrt{42}}{70} J\,(131) + \frac{6\sqrt{3}}{35} J\,(331)$$

$$|\,p_1\,d_2) = \frac{3}{10}\,J\,(111) + \frac{9\sqrt{14}}{140}\,J\,(131) - \frac{3}{35}\,J\,(331)$$

$$|\,p_1\,f_0) = -\frac{3\sqrt{21}}{70}\,J\,(121) + \frac{\sqrt{14}}{14}\,J\,(141) - \frac{3\sqrt{6}}{35}\,J\,(231) + \frac{2}{7}\,J\,(341)$$

$$|\,p_1\,f_2) = \frac{3\sqrt{35}}{35}\,J\,(121) - \frac{\sqrt{210}}{140}\,J\,(141) + \frac{3\sqrt{10}}{35}\,J\,(231) - \frac{\sqrt{15}}{35}\,J\,(341)$$

$$|\,d_0\,d_1) = \frac{\sqrt{3}}{14}\,J\,(121) + \frac{3\sqrt{2}}{7}\,J\,(141) + \frac{\sqrt{42}}{49}\,J\,(231) + \frac{6\sqrt{7}}{49}\,J\,(341)$$

$$|\,d_0\,f_1) = \frac{3\sqrt{42}}{70}\,J\,(111) + \frac{19\sqrt{3}}{70}\,J\,(131) + \frac{\sqrt{2310}}{154}\,J\,(151) + \frac{\sqrt{42}}{35}\,J\,(331) + \frac{2\sqrt{165}}{77}\,J\,(351)$$

$$|\,d_1\,d_2) = \frac{3}{14}\,J\,(121) - \frac{\sqrt{6}}{28}\,J\,(141) + \frac{3\sqrt{14}}{49}\,J\,(231) - \frac{\sqrt{21}}{49}\,J\,(341)$$

$$|\,d_1\,f_0) = \frac{3\sqrt{21}}{70}\,J\,(111) - \frac{11\sqrt{6}}{210}\,J\,(131) + \frac{2\sqrt{1155}}{231}\,J\,(151) + \frac{2\sqrt{21}}{105}\,J\,(331) +$$

$$+ \frac{20\sqrt{330}}{1155}\,J\,(351)$$

$$|\,d_1\,f_2) = \frac{3\sqrt{35}}{70}\,J\,(111) + \frac{19\sqrt{10}}{140}\,J\,(131) - \frac{\sqrt{77}}{77}\,J\,(151) + \frac{\sqrt{35}}{35}\,J\,(331) - \frac{2\sqrt{22}}{77}\,J\,(351)$$

$$|\,d_2\,f_1) = -\frac{3\sqrt{14}}{140}\,J\,(111) + \frac{4}{35}\,J\,(131) - \frac{\sqrt{770}}{308}\,J\,(151) + \frac{2\sqrt{14}}{35}\,J\,(331) - \frac{\sqrt{55}}{77}\,J\,(351)$$

$$|\,d_2\,f_3) = \frac{3\sqrt{210}}{140}\,J\,(111) + \frac{11\sqrt{15}}{210}\,J\,(131) + \frac{\sqrt{462}}{924}\,J\,(151) - \frac{\sqrt{210}}{105}\,J\,(331) + \frac{\sqrt{33}}{231}\,J\,(351)$$

$$|\,f_0\,f_1) = \frac{\sqrt{6}}{30}\,J\,(121) + \frac{3}{22}\,J\,(141) + \frac{5\sqrt{2730}}{936}\,J\,(161) + \frac{2\sqrt{21}}{105}\,J\,(231) +$$

$$+ \frac{3\sqrt{14}}{77}\,J\,(341) + \frac{5\sqrt{195}}{234}\,J\,(361)$$

$$|\,f_1\,f_2) = \frac{\sqrt{10}}{10}\,J\,(121) + \frac{2\sqrt{15}}{55}\,J\,(141) - \frac{5\sqrt{182}}{572}\,J\,(161) + \frac{\sqrt{35}}{35}\,J\,(231) +$$

$$+ \frac{4\sqrt{210}}{385}\,J\,(341) - \frac{5\sqrt{13}}{143}\,J\,(361)$$

$$|\,f_2\,f_3) = \frac{\sqrt{6}}{12}\,J\,(121) - \frac{3}{22}\,J\,(141) + \frac{\sqrt{2730}}{1716}\,J\,(161) + \frac{\sqrt{21}}{21}\,J\,(231) - \frac{3\sqrt{14}}{77}\,J\,(341) +$$

$$+ \frac{\sqrt{195}}{429}\,J\,(361)$$

$$(p_0 d_2 | p_0 d_2) = \frac{3}{14} J(332)$$

$$| p_0 f_2) = \frac{3}{14} J(232) + \frac{\sqrt{3}}{7} J(342)$$

$$| p_1 p_1) = \frac{3\sqrt{35}}{70} J(232)$$

$$| p_1 d_1) = \frac{3}{14} J(332)$$

$$| p_1 f_1) = -\frac{3}{14} J(232) + \frac{\sqrt{30}}{28} J(342)$$

$$| p_1 f_3) = \frac{3\sqrt{6}}{28} J(232) - \frac{\sqrt{2}}{28} J(342)$$

$$| d_0 d_2) = -\frac{\sqrt{105}}{49} J(232) + \frac{3\sqrt{35}}{98} J(342)$$

$$| d_0 f_2) = \frac{\sqrt{1155}}{154} J(352)$$

$$| d_1 d_1) = \frac{3\sqrt{35}}{98} J(232) + \frac{\sqrt{105}}{49} J(342)$$

$$| d_1 f_1) = \frac{\sqrt{14}}{28} J(332) + \frac{5\sqrt{154}}{308} J(352)$$

$$| d_2 f_0) = -\frac{\sqrt{21}}{21} J(332) + \frac{5\sqrt{231}}{462} J(352)$$

$$| f_0 f_2) = -\frac{\sqrt{21}}{21} J(232) - \frac{3\sqrt{7}}{154} J(242) + \frac{\sqrt{78}}{39} J(262)$$

$$| f_1 f_1) = \frac{\sqrt{35}}{35} J(232) + \frac{\sqrt{105}}{77} J(342) + \frac{5\sqrt{130}}{286} J(362)$$

$$| f_1 f_3) = -\frac{\sqrt{21}}{42} J(232) + \frac{9\sqrt{7}}{154} J(342) - \frac{5\sqrt{78}}{858} J(362)$$

$$(p_0 f_0 | p_0 f_0) = \frac{27}{70} J(220) + \frac{12\sqrt{5}}{35} J(240) + \frac{8}{21} J(440)$$

$$| p_1 p_1) = \frac{3\sqrt{105}}{70} J(020) - \frac{2\sqrt{21}}{21} J(040) - \frac{3\sqrt{21}}{70} J(220) - \frac{2\sqrt{105}}{105} J(240)$$

$$| p_1 d_1) = \frac{9\sqrt{7}}{70} J(120) + \frac{2\sqrt{35}}{35} J(140) - \frac{9\sqrt{3}}{70} J(230) - \frac{2\sqrt{15}}{35} J(340)$$

$$| p_1 f_1) = \frac{9\sqrt{6}}{70} J(220) + \frac{\sqrt{30}}{70} J(240) - \frac{2\sqrt{6}}{21} J(440)$$

$$| d_0 d_0) = \frac{2\sqrt{21}}{21} J(040) + \frac{3\sqrt{21}}{49} J(220) + \frac{47\sqrt{105}}{735} J(240) - \frac{4\sqrt{21}}{49} J(440) +$$

$$+ \frac{3\sqrt{105}}{70} J(020)$$

$$| d_0 f_0) = \frac{27}{70} J(120) + \frac{6\sqrt{5}}{35} J(140) + \frac{2\sqrt{21}}{35} J(230) + \frac{5\sqrt{33}}{77} J(250) +$$

$$+ \frac{8\sqrt{105}}{315} J(340) + \frac{20\sqrt{165}}{693} J(450)$$

$$| d_1 d_1) = \frac{3\sqrt{105}}{70} J(020) + \frac{2\sqrt{21}}{21} J(040) + \frac{3\sqrt{21}}{98} J(220) - \frac{8\sqrt{105}}{735} J(240) -$$

$$- \frac{8\sqrt{21}}{147} J(440)$$

$$| d_1 f_1) = \frac{9\sqrt{2}}{35} J(120) + \frac{4\sqrt{10}}{35} J(140) + \frac{\sqrt{42}}{70} J(230) - \frac{5\sqrt{66}}{154} J(250) +$$

$$+ \frac{2\sqrt{210}}{315} J(340) - \frac{10\sqrt{330}}{693} J(450)$$

$$| d_2 d_2) = \frac{3\sqrt{105}}{70} J(020) + \frac{2\sqrt{21}}{21} J(040) - \frac{3\sqrt{21}}{49} J(220) - \frac{31\sqrt{105}}{1470} J(240) +$$

$$+ \frac{2\sqrt{21}}{147} J(440)$$

$$| d_2 f_2) = \frac{9\sqrt{5}}{70} J(120) + \frac{2}{7} J(140) - \frac{\sqrt{105}}{35} J(230) + \frac{\sqrt{165}}{154} J(250) -$$

$$- \frac{4\sqrt{21}}{63} J(340) + \frac{10\sqrt{33}}{693} J(450)$$

$$| f_0 f_0) = \frac{3\sqrt{105}}{70} J(020) + \frac{2\sqrt{21}}{21} J(040) + \frac{2\sqrt{21}}{35} J(220) + \frac{169\sqrt{105}}{3465} J(240) +$$

$$+ \frac{10\sqrt{1365}}{1001} J(260) + \frac{4\sqrt{21}}{77} J(440) + \frac{200\sqrt{273}}{9009} J(460)$$

$$|\, f_1\, f_1) = \frac{3\sqrt{105}}{70}\, J\,(020) + \frac{2\sqrt{21}}{21}\, J\,(040) + \frac{3\sqrt{21}}{70}\, J\,(220) + \frac{53\sqrt{105}}{2310}\, J\,(240) -$$

$$- \frac{15\sqrt{1365}}{2002}\, J\,(260) + \frac{2\sqrt{21}}{231}\, J\,(440) - \frac{50\sqrt{273}}{3003}\, J\,(460)$$

$$|\, f_2\, f_2) = \frac{3\sqrt{105}}{70}\, J\,(020) + \frac{2\sqrt{21}}{21}\, J\,(040) - \frac{3\sqrt{105}}{110}\, J\,(240) + \frac{3\sqrt{1365}}{1001}\, J\,(260) -$$

$$- \frac{2\sqrt{21}}{33}\, J\,(440) + \frac{20\sqrt{273}}{3003}\, J\,(460)$$

$$|\, f_3\, f_3) = \frac{3\sqrt{105}}{70}\, J\,(020) + \frac{2\sqrt{21}}{21}\, J\,(040) - \frac{\sqrt{21}}{14}\, J\,(220) - \frac{139\sqrt{105}}{6939}\, J\,(240) -$$

$$- \frac{\sqrt{1365}}{2002}\, J\,(260) + \frac{2\sqrt{21}}{177}\, J\,(440) - \frac{10\sqrt{273}}{9009}\, J\,(460)$$

$$(p_0 f_1 \,|\, p_0\, f_1) = \frac{12}{35}\, J\,(221) + \frac{2\sqrt{6}}{7}\, J\,(241) + \frac{5}{14}\, J\,(441)$$

$$|\, p_1\, d_0) = -\frac{\sqrt{42}}{35}\, J\,(121) - \frac{\sqrt{7}}{14}\, J\,(141) + \frac{6\sqrt{3}}{35}\, J\,(231) + \frac{3\sqrt{2}}{14}\, J\,(341)$$

$$|\, p_1\, d_2) = \frac{3\sqrt{14}}{35}\, J\,(121) + \frac{\sqrt{21}}{14}\, J\,(141) - \frac{3}{35}\, J\,(231) - \frac{\sqrt{6}}{28}\, J\,(341)$$

$$|\, p_1\, f_0) = -\frac{3\sqrt{6}}{35}\, J\,(221) + \frac{1}{14}\, J\,(241) + \frac{5\sqrt{6}}{42}\, J\,(441)$$

$$|\, p_1\, f_2) = \frac{3\sqrt{10}}{35}\, J\,(221) + \frac{3\sqrt{15}}{70}\, J\,(241) - \frac{\sqrt{10}}{28}\, J\,(441)$$

$$|\, d_0\, d_1) = \frac{\sqrt{42}}{49}\, J\,(221) + \frac{17\sqrt{7}}{98}\, J\,(241) + \frac{5\sqrt{42}}{98}\, J\,(441)$$

$$|\, d_0\, f_1) = \frac{6\sqrt{3}}{35}\, J\,(121) + \frac{3\sqrt{2}}{14}\, J\,(141) + \frac{\sqrt{42}}{35}\, J\,(231) + \frac{2\sqrt{165}}{77}\, J\,(251) +$$

$$+ \frac{\sqrt{7}}{14}\, J\,(341) + \frac{5\sqrt{110}}{154}\, J\,(451)$$

$$|\, d_1\, d_2) = \frac{3\sqrt{14}}{49}\, J\,(221) - \frac{\sqrt{21}}{49}\, J\,(241) + \frac{5\sqrt{21}}{98}\, J\,(241) - \frac{5\sqrt{14}}{196}\, J\,(441)$$

$$|\, d_1\, f_0) = -\frac{3\sqrt{6}}{35}\, J\,(121) - \frac{3}{14}\, J\,(141) + \frac{2\sqrt{21}}{105}\, J\,(231) + \frac{4\sqrt{330}}{231}\, J\,(251) +$$

$$+ \frac{\sqrt{14}}{42}\, J\,(341) + \frac{10\sqrt{55}}{231}\, J\,(451)$$

$$| d_1 f_2) = \frac{3\sqrt{10}}{35} J(121) + \frac{\sqrt{15}}{14} J(141) + \frac{\sqrt{35}}{35} J(231) - \frac{2\sqrt{22}}{77} J(251) +$$

$$+ \frac{\sqrt{210}}{84} J(341) - \frac{5\sqrt{33}}{231} J(451)$$

$$| d_2 f_1) = -\frac{3}{35} J(121) - \frac{\sqrt{6}}{28} J(141) + \frac{2\sqrt{14}}{35} J(231) - \frac{\sqrt{55}}{77} J(251) +$$

$$+ \frac{\sqrt{21}}{21} J(341) - \frac{5\sqrt{330}}{924} J(451)$$

$$| d_2 f_2) = \frac{3\sqrt{15}}{35} J(121) + \frac{3\sqrt{10}}{28} J(141) - \frac{\sqrt{210}}{105} J(231) - \frac{\sqrt{33}}{231} J(251) -$$

$$- \frac{\sqrt{35}}{42} J(341) + \frac{5\sqrt{22}}{924} J(451)$$

$$| f_0 f_1) = \frac{2\sqrt{21}}{105} J(221) + \frac{3\sqrt{14}}{77} J(241) + \frac{5\sqrt{195}}{234} J(261) + \frac{\sqrt{14}}{42} J(241) +$$

$$+ \frac{5\sqrt{21}}{154} J(441) + \frac{25\sqrt{130}}{936} J(461)$$

$$| f_1 f_2) = \frac{\sqrt{35}}{35} J(221) + \frac{103\sqrt{210}}{4620} J(241) - \frac{5\sqrt{13}}{143} J(261) + \frac{2\sqrt{35}}{77} J(441) -$$

$$- \frac{25\sqrt{78}}{1716} J(461)$$

$$| f_2 f_2) = \frac{\sqrt{21}}{21} J(221) + \frac{19\sqrt{14}}{924} J(241) + \frac{\sqrt{195}}{429} J(261) - \frac{5\sqrt{21}}{154} J(441) +$$

$$+ \frac{5\sqrt{130}}{1716} J(461)$$

$$(p_0 f_2 | p_0 f_2) = \frac{3}{14} J(222) + \frac{2\sqrt{3}}{7} J(242) + \frac{2}{7} J(442)$$

$$| p_1 p_1) = \frac{3\sqrt{35}}{70} J(222) + \frac{\sqrt{105}}{35} J(442)$$

$$| p_1 d_1) = \frac{3}{14} J(232) + \frac{\sqrt{3}}{7} J(342)$$

$$| p_1 f_1) = -\frac{3\sqrt{10}}{140} J(222) + \frac{3\sqrt{30}}{140} J(242) + \frac{\sqrt{10}}{14} J(442)$$

$$|\, p_1 f_3) = \frac{3\sqrt{6}}{28} J(222) + \frac{5\sqrt{2}}{28} J(242) - \frac{\sqrt{6}}{42} J(442)$$

$$|\, d_0 d_2) = -\frac{\sqrt{15}}{49} J(222) - \frac{\sqrt{35}}{98} J(242) + \frac{\sqrt{105}}{49} J(442)$$

$$|\, d_0 f_2) = \frac{\sqrt{1155}}{154} J(252) + \frac{\sqrt{385}}{77} J(452)$$

$$|\, d_1 d_1) = \frac{3\sqrt{35}}{98} J(221) + \frac{2\sqrt{105}}{49} J(242) + \frac{2\sqrt{35}}{49} J(442)$$

$$|\, d_1 f_1) = \frac{\sqrt{14}}{28} J(232) + \frac{5\sqrt{154}}{308} J(252) + \frac{\sqrt{42}}{42} J(342) + \frac{5\sqrt{462}}{462} J(452)$$

$$|\, d_1 f_3) = \frac{\sqrt{210}}{84} J(232) - \frac{\sqrt{2310}}{924} J(252) + \frac{\sqrt{70}}{42} J(342) - \frac{\sqrt{770}}{462} J(452)$$

$$|\, d_2 f_0) = -\frac{\sqrt{21}}{21} J(232) + \frac{3\sqrt{231}}{462} J(252) - \frac{2\sqrt{7}}{21} J(342) + \frac{5\sqrt{77}}{231} J(452)$$

$$|\, f_0 f_2) = -\frac{\sqrt{21}}{21} J(222) - \frac{53\sqrt{7}}{462} J(242) + \frac{\sqrt{78}}{39} J(262) - \frac{\sqrt{21}}{77} J(442) + \frac{2\sqrt{26}}{39} J(462)$$

$$|\, f_1 f_1) = \frac{\sqrt{35}}{35} J(222) + \frac{37\sqrt{105}}{1155} J(242) + \frac{5\sqrt{130}}{286} J(262) + \frac{2\sqrt{35}}{77} J(442) +$$

$$+ \frac{5\sqrt{390}}{429} J(462)$$

$$|\, f_1 f_3) = -\frac{\sqrt{21}}{42} J(222) + \frac{5\sqrt{7}}{462} J(242) - \frac{5\sqrt{78}}{858} J(262) + \frac{3\sqrt{21}}{77} J(442) -$$

$$- \frac{5\sqrt{26}}{429} J(462)$$

$$(p_0 f_3 |\, p_0 f_3) = \frac{3}{18} J(443)$$

$$|\, p_1 d_2) = \frac{\sqrt{42}}{28} J(343)$$

$$|\, p_1 f_2) = \frac{\sqrt{6}}{12} J(443)$$

$$|\, d_0 f_3) = -\frac{\sqrt{15}}{18} J(343) + \frac{\sqrt{165}}{99} J(453)$$

$$\left| d_1\, d_2 = \frac{\sqrt{210}}{84} J\,(443)\right.$$

$$\left| d_1\, f_2\right) = \frac{\sqrt{30}}{36} J\,(343) + \frac{\sqrt{330}}{99} J\,(453)$$

$$\left| d_2\, f_1\right) = -\frac{\sqrt{3}}{18} J\,(343) + \frac{5\sqrt{33}}{198} J\,(453)$$

$$\left| f_0\, f_3\right) = -\frac{\sqrt{21}}{22} J\,(443) + \frac{5\sqrt{91}}{429} J\,(463)$$

$$\left| f_1\, f_2\right) = \frac{\sqrt{21}}{66} J\,(443) + \frac{5\sqrt{91}}{286} J\,(463)$$

$$(p_1 p_1 \left| p_1\, p_1\right) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{5} J\,(020) + \frac{1}{10} J\,(220) + \frac{3}{10} J\,(222)$$

$$\left| p_1\, d_1\right) = \frac{\sqrt{15}}{10} J\,(010) - \frac{3\sqrt{35}}{70} J\,(030) - \frac{\sqrt{3}}{10} J_1(120) + \frac{3\sqrt{7}}{70} J\,(230) + \frac{3\sqrt{35}}{70} J\,(232)$$

$$\left| p_1\, f_1\right) = \frac{3\sqrt{70}}{70} J\,(020) - \frac{\sqrt{14}}{14} J\,(040) - \frac{3\sqrt{14}}{70} J\,(220) - \frac{3\sqrt{14}}{140} J\,(222) +$$

$$+ \frac{\sqrt{70}}{70} J\,(240) + \frac{\sqrt{42}}{28} J\,(242)$$

$$p_1\, f_3) = \frac{3\sqrt{210}}{140} J\,(222) - \frac{\sqrt{70}}{140} J\,(242)$$

$$\left| d_0\, d_0\right) = \frac{1}{2} J\,(000) + \frac{3\sqrt{5}}{70} J\,(020) + \frac{3}{7} J\,(040) - \frac{1}{7} J\,(220) - \frac{3\sqrt{5}}{35} J\,(240)$$

$$\left| d_0\, d_2\right) = -\frac{\sqrt{3}}{7} J\,(222) + \frac{3}{14} J\,(242)$$

$$\left| d_0\, f_0\right) = \frac{3\sqrt{105}}{70} J\,(010) + \frac{2\sqrt{5}}{15} J\,(030) + \frac{5\sqrt{385}}{231} J\,(050) - \frac{3\sqrt{21}}{70} J\,(120) -$$

$$- \frac{2}{15} J\,(230) - \frac{5\sqrt{77}}{231} J\,(250)$$

$$\left| d_0\, f_2\right) = \frac{\sqrt{33}}{22} J\,(252)$$

$$\left| d_1\, d_1\right) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{35} J\,(020) - \frac{2}{7} J\,(040) - \frac{1}{14} J\,(220) + \frac{3}{14} J\,(222) +$$

$$+ \frac{2\sqrt{5}}{35} J\,(240) + \frac{\sqrt{3}}{7} J\,(242)$$

$$|\,d_1\,f_1) = \frac{\sqrt{210}}{35}\,J\,(010) + \frac{\sqrt{10}}{30}\,J\,(030) - \frac{5\sqrt{770}}{462}\,J\,(050) - \frac{\sqrt{42}}{35}\,J\,(120) -$$

$$- \frac{\sqrt{2}}{30}\,J\,(230) + \frac{\sqrt{10}}{20}\,J\,(232) + \frac{5\sqrt{154}}{462}\,J\,(250) + \frac{\sqrt{110}}{44}\,J\,(252)$$

$$|\,d_1\,f_3) = \frac{\sqrt{6}}{12}\,J\,(232) - \frac{\sqrt{66}}{132}\,J\,(252)$$

$$|\,d_2\,d_2) = \frac{1}{2}\,J\,(000) - \frac{17\sqrt{5}}{70}\,J\,(020) + \frac{1}{14}\,J\,(040) + \frac{1}{7}\,J\,(220) - \frac{\sqrt{5}}{70}\,J\,(240)$$

$$|\,d_2\,f_0) = -\frac{\sqrt{15}}{15}\,J\,(232) + \frac{5\sqrt{165}}{330}\,J\,(252)$$

$$|\,d_2\,f_2) = \frac{\sqrt{21}}{14}\,J\,(010) - \frac{1}{3}\,J\,(030) + \frac{5\sqrt{77}}{462}\,J\,(050) - \frac{\sqrt{105}}{70}\,J\,(120) +$$

$$+ \frac{\sqrt{5}}{15}\,J\,(230) - \frac{\sqrt{385}}{462}\,J\,(250)$$

$$|\,f_0\,f_0) = \frac{1}{2}\,J\,(000) + \frac{\sqrt{5}}{30}\,J\,(020) + \frac{3}{11}\,J\,(040) + \frac{50\sqrt{13}}{462}\,J\,(060) - \frac{2}{15}\,J\,(220) -$$

$$- \frac{3\sqrt{5}}{55}\,J\,(240) - \frac{10\sqrt{65}}{429}\,J\,(260)$$

$$|\,f_0\,f_2) = -\frac{\sqrt{15}}{15}\,J\,(222) - \frac{3\sqrt{5}}{110}\,J\,(242) + \frac{\sqrt{2730}}{195}\,J\,(262)$$

$$|\,f_1\,f_1) = \frac{1}{2}\,J\,(000) + \frac{1}{22}\,J\,(040) - \frac{25\sqrt{13}}{286}\,J\,(060) - \frac{1}{10}\,J\,(220) + \frac{1}{5}\,J\,(222) -$$

$$- \frac{\sqrt{5}}{110}\,J\,(240) + \frac{\sqrt{3}}{11}\,J\,(242) + \frac{5\sqrt{65}}{286}\,J\,(260) + \frac{5\sqrt{182}}{286}\,J\,(262)$$

$$|\,f_1\,f_3) = -\frac{\sqrt{15}}{30}\,J\,(222) + \frac{9\sqrt{5}}{110}\,J\,(242) - \frac{\sqrt{2730}}{858}\,J\,(262)$$

$$|\,f_2\,f_2) = \frac{1}{2}\,J\,(000) - \frac{\sqrt{5}}{10}\,J\,(020) - \frac{7}{22}\,J\,(040) + \frac{5\sqrt{13}}{143}\,J\,(060) +$$

$$+ \frac{7\sqrt{5}}{110}\,J\,(240) - \frac{5\sqrt{65}}{715}\,J\,(260)$$

$$|\,f_3\,f_3) = \frac{1}{2}\,J\,(000) - \frac{4\sqrt{5}}{15}\,J\,(020) + \frac{3}{22}\,J\,(040) - \frac{5\sqrt{13}}{858}\,J\,(060) + \frac{1}{6}\,J\,(220) -$$

$$- \frac{3\sqrt{5}}{110}\,J\,(240) + \frac{\sqrt{65}}{858}\,J\,(260)$$

$$(p_1 d_0 | p_1 d_0) = \frac{1}{10} J(111) - \frac{3\sqrt{14}}{35} J(131) + \frac{9}{35} J(331)$$

$$| p_1 d_2) = -\frac{\sqrt{3}}{10} J(111) + \frac{\sqrt{42}}{20} J(131) - \frac{3\sqrt{3}}{70} J(331)$$

$$| p_1 f_0) = \frac{3\sqrt{7}}{70} J(121) - \frac{\sqrt{42}}{42} J(141) - \frac{9\sqrt{2}}{70} J(231) + \frac{\sqrt{3}}{7} J(341)$$

$$| p_1 f_2) = -\frac{\sqrt{105}}{70} J(121) + \frac{\sqrt{70}}{140} J(141) + \frac{3\sqrt{30}}{70} J(231) - \frac{3\sqrt{5}}{70} J(341)$$

$$| d_0 d_1) = -\frac{1}{14} J(121) - \frac{\sqrt{6}}{14} J(141) + \frac{3\sqrt{14}}{98} J(231) + \frac{3\sqrt{21}}{49} J(341)$$

$$| d_0 f_1) = -\frac{3\sqrt{14}}{70} J(111) + \frac{11}{70} J(131) - \frac{\sqrt{770}}{154} J(151) + \frac{3\sqrt{14}}{70} J(331) + \frac{3\sqrt{55}}{77} J(351)$$

$$| d_1 d_2) = -\frac{\sqrt{3}}{14} J(121) + \frac{\sqrt{2}}{28} J(141) + \frac{3\sqrt{42}}{98} J(231) - \frac{3\sqrt{7}}{98} J(341)$$

$$| d_1 f_0) = \frac{3\sqrt{7}}{70} J(111) - \frac{17\sqrt{2}}{105} J(131) - \frac{2\sqrt{385}}{231} J(151) + \frac{\sqrt{7}}{35} J(331) + \frac{2\sqrt{110}}{77} J(351)$$

$$| d_1 f_2) = -\frac{\sqrt{105}}{70} J(111) + \frac{11\sqrt{30}}{420} J(131) + \frac{\sqrt{231}}{231} J(151) + \frac{\sqrt{105}}{70} J(331) -$$

$$- \frac{3\sqrt{66}}{231} J(351)$$

$$| d_2 f_1) = \frac{\sqrt{42}}{140} J(111) - \frac{23\sqrt{3}}{210} J(131) + \frac{\sqrt{2310}}{924} J(151) + \frac{\sqrt{42}}{35} J(331) - \frac{\sqrt{165}}{154} J(351)$$

$$d_2 f_2) = -\frac{3\sqrt{70}}{140} J(111) + \frac{17\sqrt{5}}{105} J(131) - \frac{\sqrt{154}}{924} J(151) - \frac{\sqrt{70}}{70} J(331) + \frac{\sqrt{11}}{154} J(351)$$

$$| f_0 f_1) = -\frac{\sqrt{2}}{30} J(121) - \frac{\sqrt{3}}{22} J(141) - \frac{5\sqrt{910}}{936} J(161) + \frac{3\sqrt{42}}{154} J(341) +$$

$$\frac{5\sqrt{65}}{156} J(361) + \frac{\sqrt{7}}{35} J(231)$$

$$| f_1 f_2) = -\frac{\sqrt{30}}{60} J(121) - \frac{2\sqrt{5}}{55} J(141) + \frac{5\sqrt{546}}{1716} J(161) + \frac{\sqrt{105}}{70} J(231) +$$

$$+ \frac{6\sqrt{70}}{385} J(341) - \frac{5\sqrt{39}}{286} J(361)$$

$$|\, f_2\, f_3) = -\frac{\sqrt{2}}{12}\, J\,(121) + \frac{\sqrt{3}}{22}\, J\,(141) - \frac{\sqrt{910}}{1716}\, J\,(161) + \frac{\sqrt{7}}{14}\, J\,(231) -$$

$$- \frac{3\sqrt{42}}{154}\, J\,(341) + \frac{\sqrt{65}}{286}\, J\,(361)$$

$$(p_1 d_1 |\, p_1 d_1) = \frac{3}{10}\, J\,(110) - \frac{3\sqrt{21}}{35}\, J\,(130) + \frac{9}{70}\, J\,(330) + \frac{3}{14}\, J\,(332)$$

$$|\, p_1\, f_1) = \frac{3\sqrt{42}}{70}\, J\,(120) - \frac{\sqrt{210}}{70}\, J\,(140) - \frac{9\sqrt{2}}{70}\, J\,(230) - \frac{3\sqrt{10}}{140}\, J\,(232) +$$

$$+ \frac{3\sqrt{10}}{70}\, J\,(340) + \frac{\sqrt{30}}{28}\, J\,(342)$$

$$|\, p_1\, f_3) = \frac{3\sqrt{6}}{28}\, J\,(232) - \frac{\sqrt{2}}{14}\, J\,(342)$$

$$|\, d_0\, d_0) = \frac{\sqrt{15}}{10}\, J\,(010) - \frac{3\sqrt{35}}{70}\, J\,(030) + \frac{\sqrt{3}}{7}\, J\,(120) + \frac{3\sqrt{15}}{35}\, J\,(140) -$$

$$- \frac{3\sqrt{7}}{49}\, J\,(230) - \frac{9\sqrt{35}}{245}\, J\,(340)$$

$$|\, d_0\, d_2) = -\frac{\sqrt{105}}{49}\, J\,(232) + \frac{3\sqrt{35}}{98}\, J\,(342)$$

$$|\, d_0\, f_0) = \frac{\sqrt{15}}{10}\, J\,(010) - \frac{3\sqrt{35}}{70}\, J\,(030) + \frac{\sqrt{3}}{7}\, J\,(120) + \frac{3\sqrt{15}}{35}\, J\,(140) -$$

$$- \frac{3\sqrt{7}}{49}\, J\,(230) - \frac{9\sqrt{35}}{245}\, J\,(340)$$

$$|\, d_0\, f_2) = \frac{\sqrt{1155}}{154}\, J\,(352)$$

$$|\, d_1\, d_1) = \frac{\sqrt{15}}{10}\, J\,(010) + \frac{\sqrt{3}}{14}\, J\,(120) - \frac{3\sqrt{35}}{70}\, J\,(030) - \frac{2\sqrt{15}}{35}\, J\,(140) -$$

$$- \frac{3\sqrt{7}}{98}\, J\,(230) + \frac{6\sqrt{35}}{245}\, J\,(340) + \frac{3\sqrt{35}}{98}\, J\,(232) + \frac{\sqrt{105}}{49}\, J\,(342)$$

$$|\, d_1\, f_1) = \frac{3\sqrt{14}}{35}\, J\,(110) + \frac{\sqrt{6}}{30}\, J\,(130) - \frac{5\sqrt{462}}{462}\, J\,(150) - \frac{\sqrt{14}}{70}\, J\,(330) +$$

$$+ \frac{5\sqrt{22}}{154}\, J\,(350) + \frac{\sqrt{14}}{28}\, J\,(332) + \frac{5\sqrt{154}}{308}\, J\,(352)$$

$$|\, d_1\, f_3) = \frac{\sqrt{210}}{84}\, J\,(332) - \frac{\sqrt{2310}}{924}\, J\,(352)$$

$$\left| d_2\, d_2 \right) = \frac{\sqrt{15}}{10} J(010) - \frac{3\sqrt{35}}{70} J(030) - \frac{\sqrt{3}}{7} J(120) + \frac{\sqrt{15}}{70} J(140) + \frac{3\sqrt{7}}{49} J(230) - \frac{3\sqrt{35}}{14} J(340)$$

$$\left| d_2\, f_0 \right) = -\frac{\sqrt{21}}{21} J(332) + \frac{5\sqrt{231}}{462} J(352)$$

$$\left| d_2\, f_2 \right) = \frac{3\sqrt{35}}{70} J(110) - \frac{23\sqrt{15}}{210} J(130) + \frac{\sqrt{1155}}{462} J(150) + \frac{\sqrt{35}}{35} J(330) - \frac{\sqrt{55}}{154} J(350)$$

$$\left| f_0\, f_0 \right) = \frac{\sqrt{15}}{10} J(010) - \frac{3\sqrt{35}}{70} J(030) + \frac{2\sqrt{3}}{15} J(120) + \frac{3\sqrt{15}}{55} J(140) + \frac{10\sqrt{195}}{429} J(160) - \frac{2\sqrt{7}}{35} J(230) - \frac{9\sqrt{35}}{385} J(340) - \frac{2\sqrt{455}}{1001} J(360)$$

$$\left| f_0\, f_2 \right) = -\frac{\sqrt{21}}{21} J(232) - \frac{3\sqrt{7}}{154} J(342) + \frac{\sqrt{78}}{39} J(362)$$

$$\left| f_1\, f_1 \right) = \frac{\sqrt{15}}{10} J(010) - \frac{3\sqrt{35}}{70} J(030) + \frac{\sqrt{3}}{10} J(120) + \frac{\sqrt{15}}{110} J(140) - \frac{5\sqrt{195}}{286} J(160) - \frac{3\sqrt{7}}{70} J(230) + \frac{\sqrt{35}}{35} J(232) - \frac{3\sqrt{35}}{770} J(340) + \frac{\sqrt{105}}{77} J(342) + \frac{15\sqrt{455}}{2002} J(360) + \frac{5\sqrt{130}}{286} J(362)$$

$$\left| f_1\, f_3 \right) = -\frac{\sqrt{21}}{42} J(232) + \frac{9\sqrt{7}}{154} J(342) - \frac{5\sqrt{78}}{858} J(362)$$

$$\left| f_2\, f_2 \right) = \frac{\sqrt{15}}{10} J(010) - \frac{3\sqrt{35}}{70} J(030) - \frac{7\sqrt{15}}{110} J(140) + \frac{\sqrt{195}}{143} J(160) + \frac{3\sqrt{35}}{110} J(340) - \frac{3\sqrt{455}}{1001} J(360)$$

$$\left| f_3\, f_3 \right) = \frac{\sqrt{15}}{10} J(010) - \frac{\sqrt{3}}{6} J(120) + \frac{3\sqrt{15}}{110} J(140) - \frac{\sqrt{195}}{858} J(160) - \frac{3\sqrt{35}}{70} J(030) + \frac{\sqrt{7}}{14} J(230) - \frac{9\sqrt{35}}{770} J(340) + \frac{\sqrt{455}}{2002} J(360)$$

$$(p_1 d_2 | p_1 d_2) = \frac{3}{10} J(111) - \frac{3\sqrt{14}}{70} J(131) + \frac{3}{140} J(331) + \frac{9}{28} J(333)$$

$$| p_1 f_0) = -\frac{3\sqrt{21}}{70} J(121) + \frac{\sqrt{14}}{14} J(141) + \frac{3\sqrt{6}}{140} J(231) - \frac{1}{14} J(341)$$

$$| p_1 f_2) = \frac{3\sqrt{35}}{70} J(121) - \frac{\sqrt{210}}{140} J(141) - \frac{3\sqrt{10}}{140} J(231) + \frac{\sqrt{15}}{140} J(341) + \frac{3\sqrt{7}}{28} J(343)$$

$$| d_0 d_1) = \frac{\sqrt{3}}{14} J(121) + \frac{3\sqrt{2}}{14} J(141) - \frac{\sqrt{42}}{196} J(231) - \frac{3\sqrt{7}}{98} J(343)$$

$$| d_0 f_1) = \frac{3\sqrt{42}}{70} J(111) + \frac{\sqrt{3}}{10} J(131) + \frac{\sqrt{2310}}{154} J(151) - \frac{3\sqrt{3}}{70} J(131) -$$

$$- \frac{\sqrt{42}}{140} J(331) - \frac{\sqrt{165}}{154} J(351)$$

$$| d_0 f_3) = \frac{\sqrt{770}}{154} J(353) - \frac{\sqrt{70}}{28} J(333)$$

$$| d_1 d_2) = \frac{3}{14} J(121) - \frac{\sqrt{6}}{28} J(141) - \frac{3\sqrt{14}}{196} J(231) + \frac{\sqrt{21}}{196} J(341) + \frac{3\sqrt{5}}{28} J(343)$$

$$| d_1 f_0) = -\frac{3\sqrt{21}}{70} J(151) + \frac{23\sqrt{6}}{420} J(131) + \frac{2\sqrt{1155}}{231} J(151) - \frac{\sqrt{21}}{210} J(331) -$$

$$- \frac{\sqrt{330}}{231} J(351)$$

$$| d_1 f_2) = \frac{3\sqrt{35}}{70} J(111) + \frac{\sqrt{10}}{35} J(131) - \frac{\sqrt{77}}{77} J(151) - \frac{\sqrt{35}}{140} J(331) + \frac{\sqrt{22}}{154} J(351) +$$

$$+ \frac{\sqrt{35}}{28} J(333) + \frac{\sqrt{385}}{77} J(353)$$

$$| d_2 f_1) = -\frac{3\sqrt{14}}{140} J(111) + \frac{31}{140} J(131) - \frac{\sqrt{770}}{308} J(151) - \frac{\sqrt{14}}{70} J(331) +$$

$$+ \frac{\sqrt{55}}{308} J(351) - \frac{\sqrt{14}}{28} J(333) + \frac{5\sqrt{154}}{308} J(353)$$

$$| d_2 f_3) = \frac{3\sqrt{210}}{140} J(111) - \frac{23\sqrt{15}}{420} J(131) + \frac{\sqrt{462}}{924} J(151) + \frac{\sqrt{210}}{420} J(331) - \frac{\sqrt{33}}{924} J(351)$$

$$| f_0 f_1) = \frac{\sqrt{6}}{30} J(121) + \frac{3}{22} J(141) + \frac{5\sqrt{2730}}{936} J(161) - \frac{\sqrt{21}}{210} J(231) -$$

$$- \frac{3\sqrt{14}}{308} J(341) - \frac{5\sqrt{195}}{936} J(361)$$

$$| f_0\, f_3) = -\frac{9\sqrt{2}}{44} J\,(343) + \frac{5\sqrt{78}}{286} J\,(363)$$

$$| f_1\, f_2) = \frac{\sqrt{10}}{20} J\,(121) + \frac{2\sqrt{15}}{55} J\,(141) - \frac{5\sqrt{182}}{572} J\,(161) - \frac{\sqrt{35}}{140} J\,(231) -$$

$$- \frac{\sqrt{210}}{385} J\,(341) + \frac{5\sqrt{13}}{572} J\,(361) + \frac{3\sqrt{2}}{44} J\,(343) + \frac{15\sqrt{78}}{572} J\,(363)$$

$$| f_2\, f_3) = \frac{\sqrt{6}}{12} J\,(121) - \frac{3}{22} J\,(141) + \frac{\sqrt{2730}}{1716} J\,(161) - \frac{\sqrt{21}}{84} J\,(231) + \frac{3\sqrt{14}}{308} J\,(341) -$$

$$- \frac{\sqrt{195}}{1716} J\,(361)$$

$$(p_1\, f_0 | \, p_1\, f_0) = \frac{9}{70} J\,(221) - \frac{\sqrt{6}}{7} J\,(241) + \frac{5}{21} J\,(441)$$

$$| p_1\, f_2) = -\frac{3\sqrt{15}}{70} J\,(221) + \frac{13\sqrt{10}}{140} J\,(241) - \frac{\sqrt{15}}{42} J\,(441)$$

$$| d_0\, d_1) = -\frac{3\sqrt{7}}{98} J\,(221) - \frac{2\sqrt{42}}{147} J\,(241) + \frac{5\sqrt{7}}{49} J\,(441)$$

$$| d_0\, f_1) = \frac{\sqrt{3}}{7} J\,(141) - \frac{9\sqrt{2}}{70} J\,(121) - \frac{2\sqrt{7}}{70} J\,(231) - \frac{3\sqrt{110}}{154} J\,(251) +$$

$$+ \frac{\sqrt{42}}{42} J\,(341) + \frac{5\sqrt{165}}{231} J\,(451)$$

$$| d_1\, d_2) = -\frac{3\sqrt{21}}{98} J\,(221) + \frac{13\sqrt{14}}{196} J\,(241) - \frac{5\sqrt{21}}{294} J\,(441)$$

$$| d_1\, f_0) = \frac{9}{70} J\,(121) - \frac{\sqrt{14}}{70} J\,(231) - \frac{2\sqrt{55}}{77} J\,(251) - \frac{\sqrt{6}}{14} J\,(141) + \frac{\sqrt{21}}{63} J\,(341) +$$

$$+ \frac{10\sqrt{330}}{693} J\,(451)$$

$$| d_1\, f_2) = \frac{\sqrt{10}}{14} J\,(141) + \frac{\sqrt{35}}{42} J\,(341) - \frac{5\sqrt{22}}{231} J\,(451)$$

$$| d_2\, f_1) = \frac{3\sqrt{6}}{140} J\,(121) - \frac{\sqrt{21}}{35} J\,(231) + \frac{\sqrt{330}}{308} J\,(251) - \frac{1}{14} J\,(141) + \frac{\sqrt{14}}{21} J\,(341) -$$

$$- \frac{5\sqrt{55}}{462} J\,(451)$$

$$| d_2 f_3) = -\frac{9\sqrt{10}}{140} J(121) + \frac{\sqrt{35}}{70} J(231) - \frac{\sqrt{22}}{308} J(251) + \frac{\sqrt{15}}{14} J(141) -$$

$$- \frac{\sqrt{210}}{126} J(341) + \frac{5\sqrt{33}}{1386} J(451)$$

$$| f_0 f_1) = -\frac{5\sqrt{21}}{1386} J(241) - \frac{\sqrt{14}}{70} J(221) - \frac{5\sqrt{130}}{312} J(261) + \frac{5\sqrt{14}}{154} J(441) +$$

$$+ \frac{25\sqrt{195}}{1404} J(461)$$

$$| f_1 f_2) = -\frac{\sqrt{210}}{140} J(221) - \frac{6\sqrt{35}}{385} J(241) + \frac{5\sqrt{78}}{572} J(261) + \frac{\sqrt{35}}{42} J(241) +$$

$$+ \frac{2\sqrt{210}}{231} J(441) - \frac{25\sqrt{13}}{858} J(461)$$

$$| f_2 f_3) = -\frac{\sqrt{14}}{28} J(221) + \frac{41\sqrt{21}}{693} J(241) - \frac{\sqrt{130}}{572} J(261) - \frac{5\sqrt{14}}{154} J(441) +$$

$$+ \frac{5\sqrt{195}}{2574} J(461)$$

$$(p_1 f_1 | p_1 f_1) = \frac{9}{35} J(220) - \frac{6\sqrt{5}}{35} J(240) + \frac{1}{7} J(440) + \frac{3}{140} J(222) - \frac{\sqrt{3}}{14} J(242) +$$

$$+ \frac{5}{28} J(442)$$

$$| p_1 f_3) = -\frac{3\sqrt{15}}{140} J(222) + \frac{4\sqrt{5}}{35} J(242) - \frac{\sqrt{15}}{84} J(442)$$

$$| d_0 d_0) = \frac{3\sqrt{70}}{70} J(020) + \frac{3\sqrt{14}}{49} J(220) + \frac{4\sqrt{70}}{245} J(240) - \frac{\sqrt{14}}{14} J(040) -$$

$$- \frac{3\sqrt{14}}{49} J(440)$$

$$| d_0 d_2) = \frac{\sqrt{42}}{98} J(222) - \frac{13\sqrt{14}}{196} J(242) + \frac{5\sqrt{42}}{196} J(442)$$

$$| d_0 f_0) = \frac{9\sqrt{6}}{70} J(120) + \frac{2\sqrt{14}}{35} J(230) + \frac{5\sqrt{22}}{77} J(250) - \frac{3\sqrt{30}}{70} J(140) -$$

$$- \frac{2\sqrt{70}}{105} J(340) - \frac{5\sqrt{110}}{231} J(450)$$

$$|\, d_0\, f_2) = -\frac{\sqrt{462}}{308}\, J\,(252) + \frac{5\sqrt{154}}{308}\, J\,(452)$$

$$|\, d_1\, d_1) = \frac{3\sqrt{70}}{70}\, J\,(020) + \frac{3\sqrt{14}}{98}\, J\,(220) - \frac{6\sqrt{70}}{245}\, J\,(240) - \frac{\sqrt{14}}{14}\, J\,(040) -$$

$$-\frac{\sqrt{70}}{98}\, J\,(240) + \frac{2\sqrt{14}}{49}\, J\,(440) - \frac{3\sqrt{14}}{196}\, J\,(222) + \frac{3\sqrt{42}}{196}\, J\,(242) + \frac{5\sqrt{14}}{98}\, J\,(442)$$

$$|\, d_1\, f_1) = \frac{6\sqrt{3}}{35}\, J\,(120) + \frac{\sqrt{7}}{35}\, J\,(230) - \frac{5\sqrt{11}}{77}\, J\,(250) - \frac{2\sqrt{15}}{35}\, J\,(140) -$$

$$-\frac{\sqrt{35}}{105}\, J\,(340) + \frac{5\sqrt{55}}{231}\, J\,(450) - \frac{\sqrt{35}}{140}\, J\,(232) - \frac{\sqrt{385}}{308}\, J\,(252) +$$

$$+\frac{\sqrt{105}}{84}\, J\,(342) + \frac{5\sqrt{1155}}{924}\, J\,(452)$$

$$|\, d_1\, f_3) = -\frac{\sqrt{21}}{84}\, J\,(232) + \frac{\sqrt{231}}{924}\, J\,(252) + \frac{5\sqrt{7}}{84}\, J\,(342) - \frac{5\sqrt{77}}{924}\, J\,(452)$$

$$|\, d_2\, d_2) = \frac{3\sqrt{70}}{70}\, J\,(020) - \frac{3\sqrt{14}}{49}\, J\,(220) + \frac{3\sqrt{70}}{490}\, J\,(240) - \frac{\sqrt{14}}{14}\, J\,(040) +$$

$$+\frac{\sqrt{70}}{49}\, J\,(240) - \frac{\sqrt{14}}{98}\, J\,(440)$$

$$|\, d_2\, f_0) = \frac{\sqrt{210}}{210}\, J\,(232) - \frac{\sqrt{2310}}{924}\, J\,(252) - \frac{\sqrt{70}}{42}\, J\,(342) + \frac{5\sqrt{770}}{924}\, J\,(452)$$

$$|\, d_2\, f_2) = \frac{3\sqrt{30}}{70}\, J\,(120) - \frac{\sqrt{70}}{35}\, J\,(230) + \frac{\sqrt{110}}{154}\, J\,(250) - \frac{\sqrt{6}}{14}\, J\,(140) +$$

$$+\frac{\sqrt{14}}{21}\, J\,(340) - \frac{5\sqrt{22}}{462}\, J\,(450)$$

$$|\, f_0\, f_0) = \frac{3\sqrt{70}}{70}\, J\,(020) + \frac{2\sqrt{14}}{35}\, J\,(220) + \frac{\sqrt{70}}{231}\, J\,(240) + \frac{10\sqrt{910}}{1001}\, J\,(260) -$$

$$-\frac{\sqrt{14}}{14}\, J\,(040) - \frac{3\sqrt{14}}{77}\, J\,(440) - \frac{50\sqrt{182}}{3003}\, J\,(460)$$

$$|\, f_0\, f_2) = \frac{\sqrt{210}}{420}\, J\,(222) - \frac{101\sqrt{70}}{4620}\, J\,(242) - \frac{\sqrt{195}}{195}\, J\,(262) - \frac{\sqrt{210}}{308}\, J\,(442) +$$

$$+\frac{\sqrt{65}}{39}\, J\,(462)$$

$$|f_1 f_1) = \frac{3\sqrt{70}}{70} J(020) + \frac{3\sqrt{14}}{70} J(220) - \frac{4\sqrt{70}}{385} J(240) - \frac{15\sqrt{910}}{2002} J(260) -$$

$$- \frac{\sqrt{14}}{14} J(040) - \frac{\sqrt{14}}{154} J(440) + \frac{25\sqrt{182}}{2002} J(460) - \frac{\sqrt{14}}{70} J(222) +$$

$$+ \frac{4\sqrt{42}}{231} J(242) - \frac{5\sqrt{13}}{286} J(262) + \frac{5\sqrt{14}}{154} J(442) + \frac{25\sqrt{39}}{858} J(462)$$

$$|f_1 f_3) = - \frac{5\sqrt{65}}{858} J(462) + \frac{3\sqrt{210}}{308} J(442) - \frac{\sqrt{70}}{84} J(242) + \frac{\sqrt{195}}{858} J(262) -$$

$$- \frac{41\sqrt{70}}{2310} J(242) - \frac{\sqrt{210}}{420} J(222)$$

$$|f_2 f_2) = \frac{3\sqrt{70}}{70} J(020) - \frac{3\sqrt{70}}{110} J(240) + \frac{3\sqrt{910}}{1001} J(260) - \frac{\sqrt{14}}{14} J(040) +$$

$$+ \frac{\sqrt{14}}{22} J(440) - \frac{5\sqrt{182}}{1001} J(460)$$

$$|f_3 f_3) = \frac{3\sqrt{70}}{70} J(020) - \frac{\sqrt{14}}{14} J(040) - \frac{\sqrt{14}}{14} J(220) + \frac{41\sqrt{70}}{1155} J(240) -$$

$$- \frac{\sqrt{910}}{2002} J(260) - \frac{3\sqrt{14}}{154} J(440) + \frac{5\sqrt{182}}{6006} J(460)$$

$$(p_1 f_2 | p_1 f_2) = - \frac{\sqrt{6}}{14} J(441) + \frac{3}{14} J(221) + \frac{1}{28} J(441) + \frac{1}{4} J(443)$$

$$|d_0 d_1) = \frac{\sqrt{105}}{98} J(221) + \frac{5\sqrt{70}}{196} J(241) - \frac{\sqrt{105}}{98} J(441)$$

$$|d_0 f_1) = \frac{3\sqrt{30}}{70} J(121) - \frac{3\sqrt{5}}{70} J(141) + \frac{\sqrt{105}}{70} J(231) + \frac{5\sqrt{66}}{154} J(251) -$$

$$- \frac{\sqrt{70}}{140} J(341) - \frac{5\sqrt{11}}{154} J(451)$$

$$|d_0 f_3) = - \frac{\sqrt{10}}{12} J(343) + \frac{\sqrt{110}}{66} J(453)$$

$$|d_1 d_2) = \frac{3\sqrt{35}}{98} J(221) - \frac{\sqrt{210}}{98} J(241) + \frac{\sqrt{35}}{196} J(441) + \frac{\sqrt{35}}{28} J(443)$$

$$|d_1 f_0) = - \frac{3\sqrt{15}}{70} J(121) + \frac{\sqrt{210}}{210} J(231) + \frac{10\sqrt{33}}{231} J(251) + \frac{3\sqrt{10}}{140} J(141) -$$

$$- \frac{\sqrt{35}}{210} J(341) - \frac{5\sqrt{22}}{231} J(451)$$

$$|d_1\,f_2) = \frac{3}{14}\,J\,(121) + \frac{\sqrt{14}}{28}\,J\,(231) - \frac{\sqrt{55}}{77}\,J\,(251) - \frac{\sqrt{6}}{28}\,J\,(141) -$$

$$- \frac{\sqrt{21}}{84}\,J\,(341) + \frac{\sqrt{330}}{462}\,J\,(451) + \frac{\sqrt{5}}{12}\,J\,(343) + \frac{\sqrt{55}}{33}\,J\,(453)$$

$$|d_2\,f_1) = -\frac{3\sqrt{10}}{140}\,J\,(121) + \frac{\sqrt{35}}{35}\,J\,(231) - \frac{5\sqrt{22}}{308}\,J\,(251) + \frac{\sqrt{15}}{140}\,J\,(141) -$$

$$- \frac{\sqrt{210}}{210}\,J\,(341) + \frac{5\sqrt{33}}{924}\,J\,(451) - \frac{\sqrt{2}}{12}\,J\,(343) + \frac{5\sqrt{22}}{132}\,J\,(453)$$

$$|d_2\,f_3) = \frac{3\sqrt{6}}{28}\,J\,(121) - \frac{\sqrt{21}}{42}\,J\,(231) + \frac{\sqrt{330}}{924}\,J\,(251) - \frac{3}{28}\,J\,(141) + .$$

$$+ \frac{\sqrt{14}}{84}\,J\,(341) - \frac{\sqrt{55}}{924}\,J\,(451)$$

$$|f_0\,f_1) = \frac{\sqrt{210}}{210}\,J\,(221) + \frac{17\sqrt{35}}{1155}\,J\,(241) + \frac{25\sqrt{78}}{936}\,J\,(261) -$$

$$- \frac{\sqrt{210}}{308}\,J\,(441) - \frac{25\sqrt{13}}{72}\,J\,(461)$$

$$|f_0\,f_3) = -\frac{3\sqrt{14}}{44}\,J\,(443) + \frac{5\sqrt{546}}{858}\,J\,(463)$$

$$|f_1\,f_2) = \frac{\sqrt{14}}{28}\,J\,(221) + \frac{13\sqrt{21}}{924}\,J\,(241) - \frac{5\sqrt{130}}{616}\,J\,(261) - \frac{\sqrt{14}}{77}\,J\,(441) +$$

$$+ \frac{5\sqrt{195}}{1716}\,J\,(461) + \frac{\sqrt{14}}{44}\,J\,(443) + \frac{5\sqrt{546}}{572}\,J\,(463)$$

$$|f_2\,f_3) = \frac{\sqrt{210}}{84}\,J\,(221) - \frac{29\sqrt{35}}{924}\,J\,(241) + \frac{5\sqrt{78}}{1716}\,J\,(261) + \frac{\sqrt{210}}{308}\,J\,(441) -$$

$$- \frac{5\sqrt{13}}{1716}\,J\,(461)$$

$$(p_1\,f_3|\,p_1\,f_3) = -\frac{\sqrt{3}}{14}\,J\,(242) + \frac{9}{28}\,J\,(222) + \frac{1}{84}\,J\,(442) + \frac{1}{3}\,J\,(444)$$

$$|d_0\,d_2) = -\frac{3\sqrt{70}}{98}\,J\,(222) + \frac{11\sqrt{210}}{588}\,J\,(242) - \frac{\sqrt{70}}{196}\,J\,(442)$$

$$|d_0\,f_2) = \frac{3\sqrt{770}}{308}\,J\,(252) - \frac{\sqrt{2310}}{924}\,J\,(452)$$

$$|d_1\,d_1) = \frac{3\sqrt{210}}{196}\,J\,(222) + \frac{5\sqrt{70}}{196}\,J\,(242) - \frac{\sqrt{210}}{294}\,J\,(442)$$

$$| d_1\, f_1) = \frac{\sqrt{21}}{28}\, J\,(232) + \frac{5\sqrt{231}}{308}\, J\,(252) - \frac{\sqrt{7}}{84}\, J\,(342) - \frac{5\sqrt{77}}{924}\, J\,(452)$$

$$| d_1\, f_3) = \frac{\sqrt{35}}{28}\, J\,(232) - \frac{\sqrt{385}}{308}\, J\,(252) - \frac{\sqrt{105}}{252}\, J\,(342) + \frac{\sqrt{1155}}{2772}\, J\,(452) + \frac{\sqrt{55}}{33}\, J\,(454)$$

$$| d_2\, d_2) = \frac{\sqrt{210}}{42}\, J\,(444)$$

$$| d_2\, f_0) = -\frac{\sqrt{14}}{14}\, J\,(232) + \frac{5\sqrt{154}}{308}\, J\,(252) + \frac{\sqrt{42}}{126}\, J\,(342) - \frac{5\sqrt{462}}{2772}\, J\,(452)$$

$$| d_2\, f_2) = \frac{\sqrt{55}}{33}\, J\,(454)$$

$$| f_0\, f_2) = -\frac{\sqrt{14}}{14}\, J\,(222) - \frac{5\sqrt{42}}{2772}\, J\,(242) + \frac{\sqrt{13}}{13}\, J\,(262) + \frac{\sqrt{14}}{308}\, J\,(442) - \frac{\sqrt{39}}{117}\, J\,(462)$$

$$| f_1\, f_1) = \frac{\sqrt{210}}{70}\, J\,(222) + \frac{17\sqrt{70}}{1155}\, J\,(242) + \frac{5\sqrt{195}}{286}\, J\,(262) - \frac{\sqrt{210}}{462}\, J\,(442) -$$

$$- \frac{5}{858}\sqrt{65}\, J\,(462)$$

$$| f_1\, f_3) = -\frac{\sqrt{14}}{28}\, J\,(222) + \frac{23\sqrt{42}}{693}\, J\,(242) - \frac{5\sqrt{13}}{286}\, J\,(262) - \frac{3\sqrt{14}}{308}\, J\,(442) +$$

$$+ \frac{5\sqrt{39}}{2574}\, J\,(462) - \frac{\sqrt{14}}{22}\, J\,(444) + \frac{5\sqrt{910}}{858}\, J\,(464)$$

$$| f_2\, f_2) = \frac{\sqrt{210}}{66}\, J\,(444) + \frac{5\sqrt{546}}{429}\, J\,(464)$$

$$(d_0 d_0 | d_0\, d_0) = \frac{2\sqrt{5}}{7}\, J\,(020) + \frac{6}{7}\, J\,(040) + \frac{12\sqrt{5}}{49}\, J\,(240) + \frac{1}{2}\, J\,(000) + \frac{10}{49}\, J\,(220) +$$

$$+ \frac{18}{49}\, J\,(440)$$

$$| d_0\, f_0) = \frac{3\sqrt{105}}{70}\, J\,(010) + \frac{2\sqrt{5}}{15}\, J\,(030) + \frac{5\sqrt{385}}{231}\, J\,(050) + \frac{3\sqrt{21}}{49}\, J\,(120) +$$

$$+ \frac{4}{21}\, J\,(230) + \frac{50\sqrt{77}}{1617}\, J\,(250) + \frac{9\sqrt{105}}{245}\, J\,(140) + \frac{4\sqrt{5}}{35}\, J\,(340) + \frac{10\sqrt{385}}{539}\, J\,(450)$$

$$| d_1\, d_1) = \frac{1}{2}\, J\,(000) + \frac{3\sqrt{5}}{14}\, J\,(020) - \frac{1}{7}\, J\,(040) + \frac{5}{49}\, J\,(220) - \frac{\sqrt{5}}{49}\, J\,(240) - \frac{12}{49}\, J\,(440)$$

$$|\,d_1\,f_1) = \frac{\sqrt{210}}{35}\,J\,(010) + \frac{\sqrt{10}}{30}\,J\,(030) - \frac{5\,\sqrt{770}}{462}\,J\,(050) + \frac{2\,\sqrt{42}}{49}\,J\,(120) +$$

$$+ \frac{\sqrt{2}}{21}\,J\,(230) - \frac{25\,\sqrt{154}}{1617}\,J\,(250) + \frac{6\,\sqrt{210}}{245}\,J\,(140) + \frac{\sqrt{10}}{35}\,J\,(340) - \frac{5\,\sqrt{770}}{539}\,J\,(450)$$

$$|\,d_2\,d_2) = \frac{1}{2}\,J\,(000) + \frac{1}{2}\,J\,(040) - \frac{10}{49}\,J\,(220) - \frac{5\,\sqrt{5}}{49}\,J\,(240) + \frac{3}{49}\,J\,(440)$$

$$|\,d_2\,f_2) = \frac{\sqrt{21}}{14}\,J\,(010) - \frac{1}{3}\,J\,(030) + \frac{5\,\sqrt{77}}{462}\,J\,(050) + \frac{\sqrt{150}}{49}\,J\,(120) - \frac{2\,\sqrt{5}}{21}\,J\,(230) +$$

$$+ \frac{5\,\sqrt{385}}{1617}\,J\,(250) + \frac{3\,\sqrt{21}}{49}\,J\,(140) - \frac{2}{7}\,J\,(340) + \frac{5\,\sqrt{77}}{539}\,J\,(450)$$

$$|\,f_0\,f_0) = \frac{1}{2}\,J\,(000) + \frac{29\,\sqrt{5}}{105}\,J\,(020) + \frac{54}{77}\,J\,(040) + \frac{50\,\sqrt{13}}{429}\,J\,(060) + \frac{4}{21}\,J\,(220) +$$

$$+ \frac{74\,\sqrt{5}}{385}\,J\,(240) + \frac{100\,\sqrt{65}}{3003}\,J\,(260) + \frac{18}{77}\,J\,(440) + \frac{100\,\sqrt{13}}{1001}\,J\,(460)$$

$$|\,f_1\,f_1) = \frac{1}{2}\,J\,(000) + \frac{17\,\sqrt{5}}{70}\,J\,(020) + \frac{73}{154}\,J\,(040) - \frac{25\,\sqrt{13}}{286}\,J\,(060) + \frac{1}{7}\,J\,(220) -$$

$$- \frac{25\,\sqrt{65}}{1001}\,J\,(260) + \frac{38\,\sqrt{5}}{385}\,J\,(240) + \frac{3}{77}\,J\,(440) - \frac{75\,\sqrt{13}}{1001}\,J\,(460)$$

$$|\,f_2\,f_2) = \frac{1}{2}\,J\,(000) + \frac{\sqrt{5}}{7}\,J\,(020) + \frac{17}{154}\,J\,(040) + \frac{5\,\sqrt{13}}{143}\,J\,(060) - \frac{\sqrt{5}}{11}\,J\,(240) +$$

$$+ \frac{10\,\sqrt{65}}{1001}\,J\,(260) - \frac{3}{11}\,J\,(440) + \frac{30\,\sqrt{13}}{1001}\,J\,(460)$$

$$|\,f_3\,f_3) = \frac{1}{2}\,J\,(000) - \frac{\sqrt{5}}{42}\,J\,(020) + \frac{87}{154}\,J\,(040) - \frac{5\,\sqrt{13}}{858}\,J\,(060) - \frac{5}{21}\,J\,(220) -$$

$$- \frac{8\,\sqrt{5}}{77}\,J\,(240) - \frac{5\,\sqrt{65}}{3003}\,J\,(260) + \frac{9}{77}\,J\,(440) - \frac{5\,\sqrt{13}}{1001}\,J\,(460)$$

$$(d_0\,d_1|\,d_0\,d_1) = \frac{5}{98}\,J\,(221) + \frac{5\,\sqrt{6}}{49}\,J\,(241) + \frac{15}{49}\,J\,(441)$$

$$|\,d_0\,f_1) = \frac{3\,\sqrt{14}}{98}\,J\,(121) + \frac{3\,\sqrt{21}}{49}\,J\,(141) + \frac{1}{14}\,J\,(231) + \frac{5\,\sqrt{770}}{1078}\,J\,(251) +$$

$$+ \frac{\sqrt{6}}{14}\,J\,(341) + \frac{5\,\sqrt{1155}}{539}\,J\,(451)$$

$$| d_1 d_2) = \frac{5\sqrt{3}}{98} J(221) + \frac{25\sqrt{2}}{196} J(241) - \frac{5\sqrt{3}}{98} J(441)$$

$$| d_1 f_0) = -\frac{3\sqrt{7}}{98} J(121) - \frac{3\sqrt{42}}{98} J(141) + \frac{\sqrt{2}}{42} J(231) + \frac{10\sqrt{385}}{1617} J(251) + \\ + \frac{\sqrt{3}}{21} J(341) + \frac{10\sqrt{2310}}{1617} J(451)$$

$$| d_1 f_2) = \frac{\sqrt{105}}{98} J(121) + \frac{3\sqrt{70}}{98} J(141) + \frac{\sqrt{30}}{84} J(231) - \frac{5\sqrt{231}}{1617} J(251) + \\ + \frac{\sqrt{5}}{14} J(341) - \frac{5\sqrt{154}}{539} J(451)$$

$$| d_2 f_1) = -\frac{\sqrt{42}}{196} J(121) - \frac{3\sqrt{7}}{98} J(141) + \frac{\sqrt{3}}{21} J(231) - \frac{5\sqrt{2310}}{6468} J(251) + \\ + \frac{\sqrt{2}}{7} J(341) - \frac{5\sqrt{385}}{1078} J(451)$$

$$| d_2 f_3) = \frac{3\sqrt{70}}{196} J(121) + \frac{3\sqrt{105}}{98} J(141) - \frac{\sqrt{5}}{42} J(231) + \frac{5\sqrt{154}}{6468} J(251) - \\ - \frac{\sqrt{30}}{42} J(341) + \frac{5\sqrt{21}}{3234} J(451)$$

$$| f_0 f_1) = \frac{\sqrt{2}}{42} J(221) + \frac{37\sqrt{3}}{462} J(241) + \frac{25\sqrt{910}}{6552} J(261) + \frac{15\sqrt{2}}{154} J(441) + \\ + \frac{25\sqrt{1365}}{3276} J(461)$$

$$| f_1 f_2) = \frac{\sqrt{30}}{84} J(221) + \frac{15\sqrt{5}}{14} J(241) - \frac{25\sqrt{546}}{12012} J(261) + \frac{2\sqrt{30}}{77} J(441) - \\ - \frac{25\sqrt{91}}{2002} J(461)$$

$$| f_2 f_3) = \frac{5\sqrt{2}}{84} J(221) + \frac{20\sqrt{3}}{231} J(241) + \frac{5\sqrt{910}}{12012} J(261) - \frac{15\sqrt{2}}{154} J(441) + \\ + \frac{5\sqrt{1365}}{6006} J(461)$$

$$(d_0 d_2 | d_0 d_2) = \frac{10}{49} J(222) - \frac{10\sqrt{3}}{49} J(242) + \frac{15}{98} J(442)$$

$$|d_0\, f_2) = -\frac{5\sqrt{11}}{77}\, J\,(252) + \frac{5\sqrt{33}}{154}\, J\,(452)$$

$$|d_1\, d_1) = -\frac{5\sqrt{3}}{49}\, J\,(222) - \frac{5}{98}\, J\,(242) - \frac{5\sqrt{3}}{49}\, J\,(442)$$

$$|d_1\, f_1) = -\frac{\sqrt{30}}{42}\, J\,(232) - \frac{5\sqrt{330}}{462}\, J\,(252) + \frac{\sqrt{10}}{28}\, J\,(342) + \frac{5\sqrt{110}}{308}\, J\,(452)$$

$$|d_1\, f_3) = -\frac{5\sqrt{2}}{42}\, J\,(232) + \frac{5\sqrt{22}}{462}\, J\,(252) + \frac{5\sqrt{6}}{84}\, J\,(342) - \frac{5\sqrt{66}}{924}\, J\,(452)$$

$$|d_2\, f_0) = \frac{2\sqrt{5}}{21}\, J\,(232) - \frac{5\sqrt{55}}{231}\, J\,(252) - \frac{\sqrt{15}}{21}\, J\,(342) + \frac{5\sqrt{165}}{462}\, J\,(452)$$

$$|f_0\, f_2) = \frac{2\sqrt{5}}{21}\, J\,(222) - \frac{8\sqrt{15}}{231}\, J\,(242) - \frac{2\sqrt{910}}{273}\, J\,(262) - \frac{3\sqrt{5}}{154}\, J\,(442) +$$

$$+ \frac{\sqrt{2730}}{273}\, J\,(462)$$

$$|f_1\, f_1) = -\frac{2\sqrt{3}}{21}\, J\,(222) + \frac{1}{77}\, J\,(242) - \frac{25\sqrt{546}}{3003}\, J\,(262) + \frac{5\sqrt{3}}{77}\, J\,(442) +$$

$$+ \frac{25\sqrt{182}}{2002}\, J\,(462)$$

$$|f_1\, f_3) = \frac{\sqrt{5}}{21}\, J\,(222) + \frac{29\sqrt{15}}{462}\, J\,(242) + \frac{5\sqrt{910}}{3003}\, J\,(262) + \frac{9\sqrt{5}}{154}\, J\,(442) -$$

$$- \frac{5\sqrt{2730}}{6006}\, J\,(462)$$

$$(d_0\, f_0|\, d_0\, f_0) = \frac{4\sqrt{21}}{35}\, J\,(130) + \frac{10\sqrt{33}}{77}\, J\,(150) + \frac{27}{70}\, J\,(110) + \frac{8}{45}\, J\,(330) +$$

$$+ \frac{40\sqrt{77}}{693}\, J\,(350) + \frac{250}{693}\, J\,(550)$$

$$|d_1\, d_1) = \frac{3\sqrt{105}}{70}\, J\,(010) + \frac{2\sqrt{5}}{15}\, J\,(030) + \frac{5\sqrt{385}}{231}\, J\,(050) + \frac{3\sqrt{21}}{98}\, J\,(120) -$$

$$- \frac{6\sqrt{105}}{245}\, J\,(140) + \frac{2}{21}\, J\,(230) + \frac{25\sqrt{77}}{1617}\, J\,(250) - \frac{8\sqrt{5}}{105}\, J\,(340) - \frac{20\sqrt{385}}{1617}\, J\,(450)$$

$$|d_1\, f_1) = \frac{9\sqrt{2}}{35}\, J\,(110) + \frac{11\sqrt{42}}{210}\, J\,(130) - \frac{5\sqrt{66}}{462}\, J\,(150) + \frac{2\sqrt{2}}{45}\, J\,(330) -$$

$$- \frac{5\sqrt{154}}{693}\, J\,(350) - \frac{125\sqrt{2}}{693}\, J\,(550)$$

$$\mid d_2\, d_2) = \frac{3\sqrt{105}}{70} J\,(010) + \frac{2\sqrt{5}}{15} J\,(030) + \frac{5\sqrt{385}}{231} J\,(050) - \frac{3\sqrt{21}}{49} J\,(120) +$$

$$+ \frac{3\sqrt{105}}{490} J\,(140) - \frac{4}{21} J\,(230) - \frac{50\sqrt{77}}{1617} J\,(250) + \frac{2\sqrt{5}}{105} J\,(340) + \frac{5\sqrt{385}}{1617} J\,(450)$$

$$\mid d_2\, f_2) = \frac{9\sqrt{5}}{70} J\,(110) - \frac{\sqrt{105}}{105} J\,(130) + \frac{13\sqrt{165}}{462} J\,(150) - \frac{4\sqrt{5}}{45} J\,(330) -$$

$$- \frac{8\sqrt{385}}{693} J\,(350) + \frac{25\sqrt{5}}{693} J\,(550)$$

$$\mid f_0\, f_0) = \frac{3\sqrt{105}}{70} J\,(010) + \frac{2\sqrt{5}}{15} J\,(030) + \frac{5\sqrt{385}}{231} J\,(050) + \frac{2\sqrt{21}}{35} J\,(120) +$$

$$+ \frac{9\sqrt{105}}{385} J\,(140) + \frac{50\sqrt{1365}}{5005} J\,(160) + \frac{8}{45} J\,(230) + \frac{20\sqrt{77}}{693} J\,(250) +$$

$$+ \frac{4\sqrt{5}}{55} J\,(340) + \frac{40\sqrt{65}}{1287} J\,(360) + \frac{10\sqrt{385}}{847} J\,(450) + \frac{500\sqrt{5005}}{99099} J\,(560)$$

$$\mid f_1\, f_1) = \frac{3\sqrt{105}}{70} J\,(010) + \frac{2\sqrt{5}}{15} J\,(030) + \frac{5\sqrt{385}}{231} J\,(050) + \frac{3\sqrt{21}}{70} J\,(120) +$$

$$+ \frac{3\sqrt{105}}{770} J\,(140) - \frac{15\sqrt{1365}}{2002} J\,(160) + \frac{2}{15} J\,(230) + \frac{5\sqrt{77}}{231} J\,(250) +$$

$$+ \frac{2\sqrt{5}}{165} J\,(340) - \frac{10\sqrt{65}}{429} J\,(360) + \frac{5\sqrt{385}}{2541} J\,(450) - \frac{125\sqrt{5005}}{33033} J\,(560)$$

$$\mid f_2\, f_2) = \frac{3\sqrt{105}}{70} J\,(010) + \frac{2\sqrt{5}}{15} J\,(030) + \frac{5\sqrt{385}}{231} J\,(050) - \frac{5\sqrt{105}}{110} J\,(140) +$$

$$+ \frac{3\sqrt{1365}}{1001} J\,(160) - \frac{14\sqrt{5}}{165} J\,(340) + \frac{4\sqrt{65}}{429} J\,(360) - \frac{5\sqrt{385}}{363} J\,(450) +$$

$$+ \frac{50\sqrt{5005}}{33033} J\,(560)$$

$$\mid f_3\, f_3) = \frac{3\sqrt{105}}{70} J\,(010) + \frac{2\sqrt{5}}{15} J\,(030) + \frac{5\sqrt{385}}{231} J\,(050) - \frac{\sqrt{21}}{14} J\,(120) +$$

$$+ \frac{9\sqrt{105}}{770} J\,(140) - \frac{\sqrt{1365}}{2002} J\,(160) - \frac{2}{9} J\,(230) - \frac{25\sqrt{77}}{693} J\,(250) +$$

$$+ \frac{2\sqrt{5}}{55} J\,(340) - \frac{2\sqrt{65}}{1287} J\,(360) + \frac{5\sqrt{385}}{847} J\,(450) - \frac{25\sqrt{5005}}{99099} J\,(560)$$

$$(d_0 f_1 \,|\, d_0 f_1) = \frac{9}{35} J(111) + \frac{3\sqrt{14}}{35} J(131) + \frac{6\sqrt{55}}{77} J(151) + \frac{1}{10} J(331) +$$

$$+ \frac{\sqrt{770}}{77} J(351) + \frac{25}{77} J(551)$$

$$|\, d_1 d_2) = \frac{3\sqrt{42}}{98} J(121) - \frac{3\sqrt{7}}{98} J(141) + \frac{\sqrt{3}}{14} J(231) + \frac{5\sqrt{2310}}{1078} J(251) -$$

$$- \frac{\sqrt{2}}{28} J(341) - \frac{5\sqrt{385}}{1078} J(451)$$

$$|\, d_1 f_0) = - \frac{9\sqrt{2}}{70} J(111) - \frac{\sqrt{7}}{70} J(131) + \frac{\sqrt{110}}{154} J(151) + \frac{\sqrt{2}}{30} J(331) +$$

$$+ \frac{3\sqrt{385}}{231} J(351) + \frac{50\sqrt{2}}{231} J(551)$$

$$|\, d_1 f_2) = \frac{3\sqrt{30}}{70} J(111) + \frac{\sqrt{105}}{35} J(131) + \frac{3\sqrt{66}}{154} J(151) + \frac{\sqrt{30}}{60} J(331) +$$

$$+ \frac{\sqrt{231}}{154} J(351) - \frac{5\sqrt{30}}{231} J(551)$$

$$|\, d_2 f_1) = - \frac{3\sqrt{3}}{70} J(111) + \frac{3\sqrt{42}}{140} J(131) - \frac{\sqrt{165}}{77} J(151) + \frac{\sqrt{3}}{15} J(331) +$$

$$+ \frac{\sqrt{2310}}{308} J(351) - \frac{25\sqrt{3}}{462} J(551)$$

$$|\, d_2 f_2) = \frac{9\sqrt{5}}{70} J(111) + \frac{\sqrt{70}}{140} J(131) + \frac{3\sqrt{11}}{77} J(151) - \frac{\sqrt{5}}{30} J(331) -$$

$$- \frac{3\sqrt{154}}{308} J(351) + \frac{5\sqrt{5}}{462} J(551)$$

$$|\, f_0 f_1) = \frac{\sqrt{7}}{35} J(121) + \frac{3\sqrt{42}}{154} J(141) + \frac{5\sqrt{65}}{156} J(161) + \frac{\sqrt{2}}{30} J(231) +$$

$$+ \frac{\sqrt{385}}{231} J(251) + \frac{\sqrt{3}}{22} J(341) + \frac{5\sqrt{910}}{936} J(361) + \frac{5\sqrt{2310}}{1694} J(451) + \frac{125\sqrt{143}}{5148} J(561)$$

$$|\, f_1 f_2) = \frac{\sqrt{105}}{140} J(121) + \frac{6\sqrt{70}}{385} J(141) - \frac{5\sqrt{39}}{286} J(161) + \frac{\sqrt{30}}{60} J(231) +$$

$$+ \frac{5\sqrt{231}}{462} J(251) + \frac{2\sqrt{5}}{55} J(341) - \frac{5\sqrt{546}}{1716} J(361) + \frac{10\sqrt{154}}{847} J(451) - \frac{25\sqrt{2145}}{9438} J(561)$$

$$\left| f_2\, f_3 \right) = \frac{\sqrt{7}}{14}\, J\,(121) - \frac{3\sqrt{42}}{154}\, J\,(141) + \frac{\sqrt{65}}{286}\, J\,(161) + \frac{\sqrt{2}}{12}\, J\,(231) + \frac{5\sqrt{385}}{462}\, J\,(251) -$$

$$- \frac{\sqrt{3}}{22}\, J\,(341) + \frac{\sqrt{910}}{1716}\, J\,(361) - \frac{5\sqrt{2310}}{1694}\, J\,(451) + \frac{25\sqrt{143}}{9438}\, J\,(561)$$

$$(d_0\, f_2 \left| d_0\, f_2 \right) = \frac{5}{22}\, J\,(552)$$

$$\left| d_1\, d_1 \right) = \frac{5\sqrt{33}}{154}\, J\,(252) + \frac{5\sqrt{11}}{77}\, J\,(452)$$

$$\left| d_1\, f_1 \right) = \frac{\sqrt{330}}{132}\, J\,(352) + \frac{5\sqrt{30}}{132}\, J\,(552)$$

$$\left| d_1\, f_3 \right) = \frac{5\sqrt{22}}{132}\, J\,(352) - \frac{5\sqrt{2}}{132}\, J\,(552)$$

$$\left| d_2\, f_0 \right) = - \frac{\sqrt{55}}{33}\, J\,(352) + \frac{5\sqrt{5}}{66}\, J\,(552)$$

$$\left| f_0\, f_2 \right) = - \frac{\sqrt{55}}{33}\, J\,(252) - \frac{\sqrt{165}}{242}\, J\,(452) + \frac{\sqrt{10010}}{429}\, J\,(562)$$

$$\left| f_1\, f_1 \right) = \frac{\sqrt{33}}{33}\, J\,(252) + \frac{5\sqrt{11}}{121}\, J\,(452) + \frac{25\sqrt{6006}}{9438}\, J\,(562)$$

$$\left| f_1\, f_3 \right) = - \frac{\sqrt{55}}{66}\, J\,(252) + \frac{3\sqrt{165}}{242}\, J\,(542) - \frac{5\sqrt{10010}}{9438}\, J\,(562)$$

$$(d_0\, f_3 \left| d_0\, f_3 \right) = \frac{5}{18}\, J\,(333) - \frac{10\sqrt{11}}{99}\, J\,(353) + \frac{10}{99}\, J\,(553)$$

$$\left| d_1\, d_2 \right) = - \frac{5\sqrt{14}}{84}\, J\,(343) + \frac{5\sqrt{154}}{462}\, J\,(453)$$

$$\left| d_1\, f_2 \right) = \frac{10\sqrt{2}}{99}\, J\,(553) - \frac{5\sqrt{22}}{198}\, J\,(353) - \frac{5\sqrt{2}}{36}\, J\,(333)$$

$$\left| d_2\, f_1 \right) = \frac{\sqrt{5}}{18}\, J\,(333) - \frac{7\sqrt{55}}{198}\, J\,(353) + \frac{5\sqrt{5}}{99}\, J\,(553)$$

$$\left| f_0\, f_3 \right) = \frac{\sqrt{35}}{22}\, J\,(343) - \frac{5\sqrt{1365}}{1287}\, J\,(363) - \frac{\sqrt{385}}{121}\, J\,(453) + \frac{10\sqrt{15015}}{14157}\, J\,(563)$$

$$\left| f_1\, f_2 \right) = - \frac{\sqrt{35}}{66}\, J\,(343) - \frac{5\sqrt{1365}}{858}\, J\,(363) + \frac{\sqrt{385}}{363}\, J\,(453) + \frac{5\sqrt{15015}}{4719}\, J\,(563)$$

$$(d_1 d_1 | d_1 d_1) = \frac{1}{2} J(000) + \frac{\sqrt{5}}{7} J(020) - \frac{4}{7} J(040) + \frac{5}{98} J(220) - \frac{4\sqrt{5}}{49} J(240) +$$

$$+ \frac{8}{49} J(440) + \frac{15}{98} J(222) + \frac{10\sqrt{3}}{49} J(242) + \frac{10}{49} J(442)$$

$$d_1 f_1) = \frac{\sqrt{210}}{35} J(010) + \frac{\sqrt{10}}{30} J(030) - \frac{5\sqrt{770}}{462} J(050) + \frac{\sqrt{42}}{49} J(120) -$$

$$- \frac{4\sqrt{210}}{245} J(140) + \frac{\sqrt{2}}{42} J(230) - \frac{25\sqrt{154}}{3234} J(250) - \frac{2\sqrt{10}}{105} J(340) + \frac{\sqrt{30}}{42} J(342) +$$

$$+ \frac{\sqrt{10}}{28} J(232) + \frac{10\sqrt{770}}{1617} J(450) + \frac{5\sqrt{330}}{462} J(452) + \frac{5\sqrt{110}}{308} J(252)$$

$$| d_1 f_3) = \frac{5\sqrt{6}}{84} J(232) - \frac{5\sqrt{66}}{924} J(252) + \frac{5\sqrt{2}}{42} J(342) - \frac{5\sqrt{22}}{462} J(452)$$

$$| d_2 d_2) = \frac{1}{2} J(000) - \frac{\sqrt{5}}{14} J(020) - \frac{3}{14} J(040) - \frac{5}{49} J(220) + \frac{9\sqrt{5}}{98} J(240) - \frac{2}{49} J(440)$$

$$| d_2 f_0) = - \frac{\sqrt{15}}{21} J(232) + \frac{5\sqrt{165}}{462} J(252) - \frac{2\sqrt{5}}{21} J(342) + \frac{5\sqrt{55}}{231} J(452)$$

$$| d_2 f_2) = \frac{\sqrt{21}}{14} J(010) - \frac{1}{3} J(030) + \frac{5\sqrt{77}}{462} J(050) + \frac{\sqrt{105}}{98} J(120) - \frac{2\sqrt{21}}{49} J(140) -$$

$$- \frac{5\sqrt{5}}{105} J(230) + \frac{5\sqrt{385}}{3234} J(250) + \frac{4}{21} J(340) - \frac{10\sqrt{77}}{1617} J(450)$$

$$| f_0 f_0) = \frac{1}{2} J(000) + \frac{43\sqrt{5}}{210} J(020) - \frac{1}{77} J(040) + \frac{50\sqrt{13}}{429} J(060) - \frac{43\sqrt{5}}{1155} J(240) +$$

$$+ \frac{2}{21} J(220) + \frac{50\sqrt{65}}{3003} J(260) - \frac{12}{77} J(440) - \frac{200\sqrt{13}}{3003} J(460)$$

$$| f_1 f_1) = \frac{1}{2} J(000) + \frac{6\sqrt{5}}{35} J(020) - \frac{37}{154} J(040) + \frac{1}{14} J(220) + \frac{1}{7} J(222) -$$

$$- \frac{39\sqrt{5}}{770} J(240) + \frac{37\sqrt{3}}{231} J(242) - \frac{25\sqrt{65}}{2002} J(260) + \frac{25\sqrt{182}}{2002} J(262) -$$

$$- \frac{2}{77} J(440) + \frac{10}{77} J(442) - \frac{25\sqrt{13}}{286} J(060) + \frac{50\sqrt{13}}{1001} J(460) + \frac{25\sqrt{546}}{3003} J(462)$$

$$| f_1 f_3) = - \frac{\sqrt{15}}{42} J(222) + \frac{5\sqrt{5}}{462} J(242) - \frac{5\sqrt{2730}}{6006} J(262) + \frac{3\sqrt{15}}{77} J(442) -$$

$$- \frac{5\sqrt{910}}{3003} J(462)$$

$$\left| f_2\, f_2 \right) = \frac{1}{2}\, J\,(000) + \frac{\sqrt{5}}{14}\, J\,(020) - \frac{93}{154}\, J\,(040) + \frac{5\sqrt{13}}{143}\, J\,(060) - \frac{\sqrt{5}}{22}\, J\,(240) +$$

$$+ \frac{5\sqrt{65}}{1001}\, J\,(260) + \frac{2}{11}\, J\,(440) - \frac{20\sqrt{13}}{1001}\, J\,(460)$$

$$\left| f_3\, f_3 \right) = \frac{1}{2}\, J\,(000) - \frac{2\sqrt{5}}{21}\, J\,(020) - \frac{23}{154}\, J\,(040) - \frac{5\sqrt{13}}{858}\, J\,(060) - \frac{5}{42}\, J\,(220) +$$

$$+ \frac{53\sqrt{5}}{462}\, J\,(240) - \frac{5\sqrt{65}}{6006}\, J\,(260) - \frac{6}{77}\, J\,(440) + \frac{10\sqrt{13}}{3003}\, J\,(460)$$

$$(d_1 d_2 | \, d_1\, d_2) = \frac{15}{98}\, J\,(221) - \frac{5\sqrt{6}}{98}\, J\,(241) + \frac{5}{196}\, J\,(441) + \frac{5}{28}\, J\,(443)$$

$$\left| d_1\, f_0 \right) = -\frac{3\sqrt{21}}{98}\, J\,(121) + \frac{3\sqrt{14}}{196}\, J\,(141) + \frac{\sqrt{6}}{42}\, J\,(231) + \frac{10\sqrt{1155}}{1617}\, J\,(251) -$$

$$- \frac{1}{42}\, J\,(341) - \frac{5\sqrt{770}}{1617}\, J\,(451)$$

$$\left| d_1\, f_2 \right) = \frac{3\sqrt{35}}{98}\, J\,(121) - \frac{\sqrt{210}}{196}\, J\,(141) + \frac{\sqrt{10}}{28}\, J\,(231) - \frac{5\sqrt{77}}{539}\, J\,(251) -$$

$$- \frac{\sqrt{15}}{84}\, J\,(341) + \frac{5\sqrt{7}}{84}\, J\,(343) + \frac{5\sqrt{462}}{3234}\, J\,(451) + \frac{5\sqrt{77}}{231}\, J\,(453)$$

$$\left| d_2\, f_1 \right) = -\frac{3\sqrt{14}}{196}\, J\,(121) + \frac{\sqrt{21}}{196}\, J\,(141) + \frac{1}{7}\, J\,(231) - \frac{5\sqrt{770}}{2156}\, J\,(251) -$$

$$- \frac{\sqrt{6}}{42}\, J\,(341) - \frac{\sqrt{70}}{84}\, J\,(343) + \frac{5\sqrt{1155}}{6468}\, J\,(451) + \frac{5\sqrt{770}}{924}\, J\,(453)$$

$$\left| d_2\, f_3 \right) = \frac{3\sqrt{210}}{196}\, J\,(121) - \frac{3\sqrt{35}}{196}\, J\,(141) - \frac{\sqrt{15}}{42}\, J\,(231) + \frac{5\sqrt{462}}{6468}\, J\,(251) +$$

$$+ \frac{\sqrt{10}}{84}\, J\,(341) - \frac{5\sqrt{77}}{6468}\, J\,(451)$$

$$\left| f_0\, f_1 \right) = \frac{\sqrt{6}}{42}\, J\,(221) + \frac{17}{231}\, J\,(241) + \frac{25\sqrt{2730}}{6552}\, J\,(261) - \frac{5\sqrt{6}}{308}\, J\,(441) -$$

$$- \frac{25\sqrt{455}}{6552}\, J\,(461)$$

$$\left| f_0\, f_3 \right) = \frac{5\sqrt{390}}{858}\, J\,(463) - \frac{3\sqrt{10}}{44}\, J\,(443)$$

$$|f_1\, f_2) = \frac{\sqrt{10}}{28}\, J\,(221) + \frac{13\sqrt{15}}{924}\, J\,(241) - \frac{25\sqrt{182}}{4004}\, J\,(261) - \frac{\sqrt{10}}{77}\, J\,(441) +$$

$$+ \frac{\sqrt{10}}{44}\, J\,(443) + \frac{25\sqrt{273}}{12012}\, J\,(461) + \frac{5\sqrt{390}}{572}\, J\,(463)$$

$$|f_2\, f_3) = \frac{5\sqrt{6}}{84}\, J\,(221) - \frac{145}{924}\, J\,(241) + \frac{5\sqrt{2730}}{12012}\, J\,(261) + \frac{5\sqrt{6}}{308}\, J\,(441) -$$

$$- \frac{5\sqrt{455}}{12012}\, J\,(461)$$

$$(d_1 f_0|\, d_1\, f_0) = -\frac{\sqrt{14}}{35}\, J\,(131) - \frac{4\sqrt{55}}{77}\, J\,(151) + \frac{9}{70}\, J\,(111) + \frac{1}{45}\, J\,(331) +$$

$$+ \frac{4\sqrt{770}}{693}\, J\,(351) + \frac{200}{693}\, J\,(551)$$

$$|d_1\, f_2) = -\frac{3\sqrt{15}}{70}\, J\,(111) - \frac{\sqrt{210}}{420}\, J\,(131) + \frac{13\sqrt{33}}{231}\, J\,(151) + \frac{\sqrt{15}}{90}\, J\,(331) +$$

$$+ \frac{4\sqrt{462}}{693}\, J\,(351) - \frac{20\sqrt{15}}{693}\, J\,(551)$$

$$|d_2\, f_1) = \frac{3\sqrt{6}}{140}\, J\,(111) - \frac{\sqrt{21}}{30}\, J\,(131) - \frac{\sqrt{330}}{924}\, J\,(151) + \frac{\sqrt{6}}{45}\, J\,(331) +$$

$$+ \frac{\sqrt{1155}}{198}\, J\,(351) - \frac{25\sqrt{6}}{693}\, J\,(551)$$

$$|d_2\, f_3) = -\frac{9\sqrt{10}}{140}\, J\,(111) + \frac{\sqrt{35}}{35}\, J\,(131) + \frac{19\sqrt{22}}{308}\, J\,(151) - \frac{\sqrt{10}}{90}\, J\,(331) -$$

$$- \frac{19\sqrt{77}}{1386}\, J\,(315) + \frac{5\sqrt{10}}{693}\, J\,(551)$$

$$|f_0\, f_1) = -\frac{\sqrt{14}}{70}\, J\,(121) - \frac{3\sqrt{21}}{154}\, J\,(141) - \frac{5\sqrt{130}}{312}\, J\,(161) + \frac{1}{45}\, J\,(231) +$$

$$+ \frac{2\sqrt{770}}{693}\, J\,(251) + \frac{\sqrt{6}}{66}\, J\,(341) + \frac{5\sqrt{455}}{1404}\, J\,(361) + \frac{10\sqrt{1155}}{2541}\, J\,(451) +$$

$$+ \frac{125\sqrt{286}}{7722}\, J\,(561)$$

$$|f_1\, f_2) = -\frac{\sqrt{210}}{140}\, J\,(121) - \frac{6\sqrt{35}}{385}\, J\,(141) + \frac{5\sqrt{78}}{572}\, J\,(161) + \frac{\sqrt{15}}{90}\, J\,(231) +$$

$$+ \frac{5\sqrt{462}}{693} J(251) + \frac{2\sqrt{10}}{165} J(341) - \frac{5\sqrt{273}}{2574} J(361) + \frac{40\sqrt{77}}{2541} J(451) -$$

$$- \frac{25\sqrt{4290}}{14157} J(561)$$

$$|f_2\, f_3) = - \frac{\sqrt{14}}{28} J(121) + \frac{3\sqrt{21}}{154} J(141) - \frac{\sqrt{130}}{572} J(161) + \frac{1}{18} J(231) +$$

$$+ \frac{5\sqrt{770}}{693} J(251) - \frac{\sqrt{6}}{66} J(341) + \frac{\sqrt{455}}{2574} J(361) - \frac{10\sqrt{1155}}{2541} J(451) + \frac{25\sqrt{286}}{14157} J(561)$$

$$(d_1\, f_1|\, d_1\, f_1) = \frac{12}{35} J(110) + \frac{4\sqrt{21}}{105} J(130) - \frac{20\sqrt{33}}{231} J(150) + \frac{1}{45} J(330) + \frac{1}{12} J(332) -$$

$$- \frac{10\sqrt{77}}{693} J(350) + \frac{5\sqrt{11}}{66} J(352) + \frac{125}{693} J(550) + \frac{25}{132} J(552)$$

$$|d_1\, f_3) = \frac{\sqrt{15}}{36} J(332) + \frac{\sqrt{165}}{99} J(352) - \frac{5\sqrt{15}}{396} J(552)$$

$$|d_2\, d_2) = \frac{\sqrt{210}}{35} J(010) + \frac{\sqrt{10}}{30} J(030) - \frac{5\sqrt{770}}{462} J(050) - \frac{2\sqrt{42}}{49} J(120) +$$

$$+ \frac{\sqrt{210}}{245} J(140) - \frac{\sqrt{2}}{21} J(230) + \frac{25\sqrt{154}}{1617} J(250) + \frac{\sqrt{10}}{210} J(340) - \frac{5\sqrt{770}}{3234} J(450)$$

$$|d_2\, f_0) = - \frac{\sqrt{6}}{18} J(332) - \frac{5\sqrt{66}}{396} J(352) + \frac{25\sqrt{6}}{396} J(552)$$

$$|d_2\, f_2) = \frac{3\sqrt{10}}{35} J(110) - \frac{\sqrt{210}}{70} J(130) - \frac{\sqrt{330}}{154} J(150) - \frac{\sqrt{10}}{45} J(330) +$$

$$+ \frac{\sqrt{770}}{126} J(350) - \frac{25\sqrt{10}}{1386} J(550)$$

$$|f_0\, f_0) = \frac{\sqrt{210}}{35} J(010) + \frac{\sqrt{10}}{30} J(030) - \frac{5\sqrt{770}}{462} J(050) + \frac{4\sqrt{42}}{105} J(120) +$$

$$+ \frac{6\sqrt{210}}{385} J(140) + \frac{20\sqrt{2730}}{3003} J(160) + \frac{2\sqrt{2}}{45} J(230) - \frac{10\sqrt{154}}{693} J(250) +$$

$$+ \frac{\sqrt{10}}{55} J(340) + \frac{10\sqrt{130}}{1287} J(360) - \frac{5\sqrt{770}}{847} J(450) - \frac{250\sqrt{10010}}{99099} J(560)$$

$$|f_0\, f_2) = - \frac{\sqrt{6}}{18} J(232) - \frac{5\sqrt{66}}{198} J(252) - \frac{\sqrt{2}}{44} J(342) - \frac{\sqrt{273}}{117} J(362) -$$

$$- \frac{5\sqrt{22}}{484} J(452) + \frac{5\sqrt{3003}}{1287} J(562)$$

$$|f_1 f_1) = \frac{\sqrt{210}}{35} J(010) + \frac{\sqrt{10}}{30} J(030) - \frac{5\sqrt{770}}{462} J(050) + \frac{\sqrt{42}}{35} J(120) +$$

$$+ \frac{\sqrt{210}}{385} J(140) - \frac{25\sqrt{2730}}{1001} J(160) + \frac{\sqrt{2}}{30} J(230) - \frac{5\sqrt{154}}{462} J(250) +$$

$$+ \frac{\sqrt{10}}{36} J(232) + \frac{\sqrt{110}}{66} J(252) + \frac{\sqrt{10}}{330} J(340) + \frac{\sqrt{30}}{66} J(342) - \frac{5\sqrt{130}}{858} J(360) +$$

$$+ \frac{5\sqrt{455}}{858} J(362) - \frac{5\sqrt{770}}{5082} J(450) + \frac{5\sqrt{330}}{726} J(452) + \frac{125\sqrt{10010}}{66066} J(560) +$$

$$+ \frac{25\sqrt{5005}}{9438} J(562)$$

$$|f_1 f_2) = - \frac{\sqrt{6}}{36} J(232) - \frac{5\sqrt{66}}{396} J(252) + \frac{3\sqrt{2}}{44} J(342) - \frac{5\sqrt{273}}{2574} J(362) +$$

$$+ \frac{15\sqrt{22}}{484} J(452) - \frac{25\sqrt{3003}}{28314} J(562)$$

$$|f_2 f_2) = \frac{\sqrt{210}}{35} J(010) + \frac{\sqrt{10}}{30} J(030) - \frac{5\sqrt{770}}{462} J(050) - \frac{\sqrt{210}}{55} J(140) +$$

$$+ \frac{2\sqrt{2730}}{1001} J(160) - \frac{7\sqrt{10}}{330} J(340) + \frac{\sqrt{130}}{429} J(360) + \frac{5\sqrt{770}}{726} J(450) -$$

$$- \frac{25\sqrt{10010}}{33033} J(560)$$

$$|f_3 f_3) = \frac{\sqrt{210}}{35} J(010) + \frac{\sqrt{10}}{30} J(030) - \frac{5\sqrt{770}}{462} J(050) - \frac{\sqrt{42}}{21} J(120) +$$

$$+ \frac{3\sqrt{210}}{385} J(140) - \frac{\sqrt{2730}}{3003} J(160) - \frac{\sqrt{2}}{18} J(230) + \frac{25\sqrt{154}}{1386} J(250) +$$

$$+ \frac{\sqrt{10}}{110} J(340) - \frac{\sqrt{130}}{2574} J(360) - \frac{5\sqrt{770}}{1694} J(450) + \frac{25\sqrt{10010}}{198198} J(560)$$

$$(d_1 f_2 | d_1 f_2) = \frac{3}{14} J(111) + \frac{\sqrt{14}}{14} J(131) - \frac{2\sqrt{55}}{77} J(151) + \frac{1}{12} J(331) + \frac{5}{36} J(333) -$$

$$- \frac{\sqrt{770}}{231} J(351) + \frac{10\sqrt{11}}{99} J(353) + \frac{10}{231} J(551) + \frac{20}{99} J(553)$$

$$|d_2 f_1) = - \frac{3\sqrt{10}}{140} J(111) + \frac{3\sqrt{35}}{140} J(131) - \frac{3\sqrt{22}}{308} J(151) + \frac{\sqrt{10}}{30} J(331) -$$

$$- \frac{13\sqrt{77}}{924} J(351) - \frac{\sqrt{10}}{36} J(333) + \frac{\sqrt{110}}{396} J(353) + \frac{5\sqrt{10}}{462} J(551) + \frac{5\sqrt{10}}{99} J(553)$$

$$| d_2\, f_3) = \frac{3\sqrt{6}}{28}\, J\,(111) + \frac{\sqrt{21}}{84}\, J\,(131) - \frac{5\sqrt{330}}{924}\, J\,(151) - \frac{\sqrt{6}}{36}\, J\,(331) +$$

$$+ \frac{5\sqrt{1155}}{2772}\, J\,(351) - \frac{5\sqrt{6}}{1386}\, J\,(551)$$

$$| f_0\, f_1) = \frac{\sqrt{210}}{210}\, J\,(121) + \frac{3\sqrt{35}}{154}\, J\,(141) + \frac{25\sqrt{78}}{936}\, J\,(161) + \frac{\sqrt{15}}{90}\, J\,(231) -$$

$$- \frac{\sqrt{462}}{693}\, J\,(251) + \frac{\sqrt{10}}{44}\, J\,(341) + \frac{25\sqrt{273}}{2808}\, J\,(361) - \frac{5\sqrt{77}}{847}\, J\,(451) - \frac{25\sqrt{4290}}{15444}\, J\,(561)$$

$$| f_0\, f_3) = - \frac{\sqrt{70}}{44}\, J\,(343) + \frac{5\sqrt{2730}}{2574}\, J\,(363) - \frac{\sqrt{770}}{121}\, J\,(453) + \frac{10\sqrt{30030}}{14157}\, J\,(563)$$

$$| f_1\, f_2) = \frac{\sqrt{14}}{28}\, J\,(121) + \frac{2\sqrt{21}}{77}\, J\,(141) - \frac{5\sqrt{130}}{572}\, J\,(161) + \frac{1}{12}\, J\,(231) -$$

$$- \frac{\sqrt{770}}{462}\, J\,(251) + \frac{\sqrt{6}}{33}\, J\,(341) - \frac{5\sqrt{455}}{1716}\, J\,(361) - \frac{4\sqrt{1155}}{2541}\, J\,(451) +$$

$$+ \frac{5\sqrt{2730}}{1716}\, J\,(363) + \frac{\sqrt{70}}{132}\, J\,(343) + \frac{\sqrt{770}}{363}\, J\,(453) + \frac{5\sqrt{30030}}{4719}\, J\,(563) + \frac{25\sqrt{286}}{9438}\, J\,(561)$$

$$| f_2\, f_3) = \frac{\sqrt{210}}{84}\, J\,(121) - \frac{3\sqrt{35}}{154}\, J\,(141) + \frac{5\sqrt{78}}{1716}\, J\,(161) + \frac{\sqrt{15}}{36}\, J\,(231) -$$

$$- \frac{5\sqrt{462}}{1386}\, J\,(251) - \frac{\sqrt{10}}{44}\, J\,(341) + \frac{5\sqrt{273}}{5148}\, J\,(361) + \frac{5\sqrt{77}}{847}\, J\,(541) - \frac{5\sqrt{4290}}{28314}\, J\,(561)$$

$$(d_1\, f_3 | \, d_1\, f_2) = \frac{5}{36}\, J\,(332) - \frac{5\sqrt{11}}{198}\, J\,(352) + \frac{5}{396}\, J\,(552) + \frac{5}{33}\, J\,(554)$$

$$| d_2\, d_2) = \frac{5\sqrt{462}}{462}\, J\,(454)$$

$$| d_2\, f_0) = - \frac{\sqrt{10}}{18}\, J\,(332) + \frac{7\sqrt{110}}{396}\, J\,(352) - \frac{5\sqrt{10}}{396}\, J\,(552)$$

$$| d_2\, f_2) = \frac{5}{33}\, J\,(554)$$

$$| f_0\, f_2) = - \frac{\sqrt{10}}{18}\, J\,(232) + \frac{\sqrt{110}}{198}\, J\,(252) - \frac{\sqrt{30}}{132}\, J\,(342) + \frac{\sqrt{455}}{117}\, J\,(362) +$$

$$+ \frac{\sqrt{330}}{1452}\, J\,(452) - \frac{\sqrt{5005}}{1287}\, J\,(562)$$

$$|f_1\, f_1) = \frac{\sqrt{6}}{18} J\,(232) - \frac{\sqrt{66}}{198} J\,(252) + \frac{5\sqrt{2}}{66} J\,(342) + \frac{25\sqrt{273}}{2574} J\,(362) -$$

$$- \frac{5\sqrt{22}}{726} J\,(452) - \frac{25\sqrt{3003}}{28314} J\,(562)$$

$$|f_1\, f_3) = - \frac{\sqrt{10}}{36} J\,(232) + \frac{\sqrt{110}}{396} J\,(252) + \frac{\sqrt{30}}{44} J\,(342) - \frac{5\sqrt{455}}{2574} J\,(362) -$$

$$- \frac{\sqrt{330}}{484} J\,(452) - \frac{\sqrt{770}}{242} J\,(454) + \frac{5\sqrt{5005}}{28314} J\,(562) + \frac{25\sqrt{2002}}{9438} J\,(564)$$

$$|f_2\, f_2) = \frac{5\sqrt{462}}{726} J\,(454) + \frac{5\sqrt{30030}}{4719} J\,(564)$$

$$(d_2 d_2|\, d_2 d_2) = - \frac{2\sqrt{5}}{7} J\,(020) + \frac{1}{7} J\,(040) + \frac{1}{2} J\,(000) + \frac{10}{49} J\,(220) - \frac{2\sqrt{5}}{49} J\,(240) +$$

$$+ \frac{1}{98} J\,(440) + \frac{5}{14} J\,(444)$$

$$|d_2\, f_2) = \frac{\sqrt{21}}{14} J\,(010) - \frac{1}{3} J\,(030) + \frac{5\sqrt{77}}{462} J\,(050) - \frac{\sqrt{105}}{49} J\,(120) + \frac{\sqrt{21}}{98} J\,(140) +$$

$$+ \frac{2\sqrt{5}}{21} J\,(230) - \frac{5\sqrt{385}}{1617} J\,(250) - \frac{1}{21} J\,(340) + \frac{5\sqrt{77}}{3234} J\,(450) + \frac{5\sqrt{462}}{462} J\,(454)$$

$$|f_0\, f_0) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{105} J\,(020) + \frac{53}{154} J\,(040) + \frac{50\sqrt{13}}{429} J\,(060) - \frac{4}{21} J\,(220) -$$

$$- \frac{68\sqrt{5}}{1155} J\,(240) - \frac{100\sqrt{65}}{3003} J\,(260) + \frac{3}{77} J\,(440) + \frac{50\sqrt{13}}{3003} J\,(460)$$

$$|f_1\, f_1) = \frac{1}{2} J\,(000) - \frac{3\sqrt{5}}{70} J\,(020) + \frac{9}{77} J\,(040) - \frac{25\sqrt{13}}{286} J\,(060) - \frac{1}{7} J\,(220) +$$

$$+ \frac{\sqrt{5}}{770} J\,(240) + \frac{25\sqrt{65}}{1001} J\,(260) + \frac{1}{154} J\,(440) - \frac{25\sqrt{13}}{2002} J\,(460)$$

$$|f_1\, f_2) = - \frac{\sqrt{15}}{22} J\,(444) + \frac{25\sqrt{39}}{858} J\,(464)$$

$$|f_2\, f_2) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{7} J\,(020) - \frac{19}{77} J\,(040) + \frac{5\sqrt{13}}{143} J\,(060) + \frac{\sqrt{5}}{11} J\,(240) -$$

$$- \frac{10\sqrt{65}}{1001} J\,(260) - \frac{1}{22} J\,(440) + \frac{5}{22} J\,(444) + \frac{5\sqrt{13}}{1001} J\,(460) + \frac{5\sqrt{65}}{143} J\,(464)$$

$$|\,f_3\,f_3) = \frac{1}{2}\,J\,(000) + \frac{13\sqrt{5}}{42}\,J\,(020) + \frac{16}{77}\,J\,(040) - \frac{5\sqrt{13}}{858}\,J\,(060) + \frac{5}{21}\,J\,(220) -$$

$$- \frac{29\sqrt{5}}{462}\,J\,(240) + \frac{5\sqrt{65}}{3003}\,J\,(260) + \frac{3}{154}\,J\,(440) - \frac{5\sqrt{13}}{6006}\,J\,(460)$$

$$(d_2\,f_0|\,d_2\,f_0) = \frac{2}{9}\,J\,(332) - \frac{10\sqrt{11}}{99}\,J\,(352) + \frac{25}{198}\,J\,(552)$$

$$|\,f_0\,f_2) = \frac{2}{9}\,J\,(232) - \frac{5\sqrt{11}}{99}\,J\,(252) + \frac{\sqrt{3}}{33}\,J\,(342) - \frac{2\sqrt{182}}{117}\,J\,(362) -$$

$$- \frac{5\sqrt{33}}{726}\,J\,(452) + \frac{5\sqrt{2002}}{1287}\,J\,(562)$$

$$|\,f_1\,f_1) = - \frac{2\sqrt{15}}{45}\,J\,(232) + \frac{\sqrt{165}}{99}\,J\,(252) - \frac{2\sqrt{5}}{33}\,J\,(342) - \frac{5\sqrt{2730}}{1287}\,J\,(362) +$$

$$+ \frac{5\sqrt{55}}{363}\,J\,(452) + \frac{25\sqrt{30030}}{28314}\,J\,(562)$$

$$|\,f_1\,f_3) = \frac{1}{9}\,J\,(232) - \frac{5\sqrt{11}}{198}\,J\,(252) - \frac{\sqrt{3}}{11}\,J\,(342) + \frac{5\sqrt{182}}{1287}\,J\,(362) +$$

$$+ \frac{5\sqrt{33}}{242}\,J\,(452) - \frac{25\sqrt{2002}}{28314}\,J\,(562)$$

$$(d_2\,f_1|\,d_2\,f_1) = \frac{3}{140}\,J\,(111) - \frac{\sqrt{14}}{35}\,J\,(131) + \frac{\sqrt{55}}{154}\,J\,(151) + \frac{2}{15}\,J\,(331) + \frac{1}{18}\,J\,(333) -$$

$$- \frac{\sqrt{770}}{231}\,J\,(351) - \frac{5\sqrt{11}}{99}\,J\,(353) + \frac{25}{924}\,J\,(551) + \frac{25}{198}\,J\,(553)$$

$$|\,d_2\,f_3) = - \frac{3\sqrt{15}}{140}\,J\,(111) + \frac{\sqrt{210}}{60}\,J\,(131) - \frac{4\sqrt{33}}{231}\,J\,(151) - \frac{\sqrt{15}}{45}\,J\,(331) +$$

$$+ \frac{\sqrt{462}}{396}\,J\,(351) - \frac{5\sqrt{15}}{2772}\,J\,(551)$$

$$|\,f_0\,f_1) = - \frac{\sqrt{21}}{210}\,J\,(121) - \frac{3\sqrt{14}}{308}\,J\,(141) - \frac{5\sqrt{195}}{936}\,J\,(161) + \frac{\sqrt{6}}{45}\,J\,(231) -$$

$$- \frac{\sqrt{1155}}{1386}\,J\,(251) + \frac{1}{11}\,J\,(341) + \frac{5\sqrt{2730}}{1404}\,J\,(361) - \frac{5\sqrt{770}}{3388}\,J\,(451) - \frac{125\sqrt{429}}{30888}\,J\,(561)$$

$$|\,f_0\,f_3) = \frac{\sqrt{7}}{22}\,J\,(343) - \frac{5\sqrt{273}}{1287}\,J\,(363) - \frac{5\sqrt{77}}{242}\,J\,(453) + \frac{25\sqrt{3003}}{14157}\,J\,(563)$$

$$|f_1\, f_2) = -\frac{\sqrt{35}}{140} J\,(121) - \frac{\sqrt{210}}{385} J\,(141) + \frac{5\sqrt{13}}{572} J\,(161) + \frac{\sqrt{10}}{30} J\,(231) -$$

$$-\frac{5\sqrt{77}}{924} J\,(251) + \frac{4\sqrt{15}}{165} J\,(341) - \frac{\sqrt{7}}{66} J\,(343) - \frac{5\sqrt{182}}{858} J\,(361) - \frac{5\sqrt{273}}{858} J\,(363) -$$

$$-\frac{5\sqrt{462}}{2541} J\,(451) + \frac{5\sqrt{77}}{726} J\,(453) + \frac{25\sqrt{715}}{18876} J\,(561) + \frac{25\sqrt{3003}}{9438} J\,(563)$$

$$|f_2\, f_3) = -\frac{\sqrt{21}}{84} J\,(121) + \frac{3\sqrt{14}}{308} J\,(141) - \frac{\sqrt{195}}{1716} J\,(161) + \frac{\sqrt{6}}{18} J\,(231) -$$

$$-\frac{5\sqrt{1155}}{2772} J\,(251) - \frac{1}{11} J\,(341) + \frac{\sqrt{2730}}{2574} J\,(361) + \frac{5\sqrt{770}}{3388} J\,(451) - \frac{25\sqrt{429}}{56628} J\,(561)$$

$$(d_2\, f_2 |\, d_2\, f_2) = \frac{3}{14} J\,(110) - \frac{2\sqrt{21}}{21} J\,(130) - \frac{5\sqrt{33}}{231} J\,(150) + \frac{2}{9} J\,(330) -$$

$$-\frac{10\sqrt{77}}{693} J\,(350) + \frac{25}{1386} J\,(550) + \frac{5}{33} J\,(554)$$

$$|f_0\, f_0) = \frac{\sqrt{21}}{14} J\,(010) - \frac{1}{3} J\,(030) + \frac{5\sqrt{77}}{462} J\,(050) + \frac{2\sqrt{105}}{105} J\,(120) + \frac{3\sqrt{21}}{77} J\,(140) +$$

$$+\frac{50\sqrt{273}}{3003} J\,(160) - \frac{4\sqrt{5}}{45} J\,(230) + \frac{2\sqrt{385}}{693} J\,(250) - \frac{2}{11} J\,(340) - \frac{100\sqrt{13}}{1287} J\,(360) +$$

$$+\frac{5\sqrt{77}}{847} J\,(450) + \frac{250\sqrt{1001}}{99099} J\,(560)$$

$$|f_1\, f_1) = \frac{\sqrt{21}}{14} J\,(010) - \frac{1}{3} J\,(030) + \frac{5\sqrt{77}}{462} J\,(050) + \frac{\sqrt{105}}{70} J\,(120) + \frac{\sqrt{21}}{154} J\,(140) -$$

$$-\frac{25\sqrt{273}}{2002} J\,(160) - \frac{\sqrt{5}}{15} J\,(230) + \frac{\sqrt{385}}{462} J\,(250) - \frac{1}{33} J\,(340) + \frac{25\sqrt{13}}{429} J\,(360) +$$

$$+\frac{5\sqrt{77}}{5082} J\,(450) - \frac{125\sqrt{1001}}{66066} J\,(560)$$

$$|f_1\, f_3) = -\frac{\sqrt{770}}{242} J\,(454) + \frac{25\sqrt{2002}}{9438} J\,(564)$$

$$|f_2\, f_2) = \frac{\sqrt{21}}{14} J\,(010) - \frac{1}{3} J\,(030) + \frac{5\sqrt{77}}{462} J\,(050) - \frac{\sqrt{21}}{22} J\,(140) +$$

$$+\frac{5\sqrt{273}}{1001} J\,(160) + \frac{7}{33} J\,(340) - \frac{10\sqrt{13}}{429} J\,(360) - \frac{5\sqrt{77}}{726} J\,(450) +$$

$$+\frac{5\sqrt{462}}{726} J\,(454) + \frac{25\sqrt{1001}}{33033} J\,(560) + \frac{5\sqrt{30030}}{4719} J\,(564)$$

$$|\,f_3\, f_3) = \frac{\sqrt{21}}{14}\, J\,(010) - \frac{1}{3}\, J\,(030) + \frac{5\sqrt{77}}{462}\, J\,(050) - \frac{\sqrt{105}}{42}\, J\,(120) +$$

$$+ \frac{3\sqrt{21}}{154}\, J\,(140) - \frac{5\sqrt{273}}{6006}\, J\,(160) + \frac{\sqrt{5}}{9}\, J\,(230) - \frac{5\sqrt{385}}{1386}\, J\,(250) -$$

$$- \frac{1}{11}\, J\,(340) + \frac{5\sqrt{13}}{1287}\, J\,(360) + \frac{5\sqrt{77}}{1694}\, J\,(450) - \frac{25\sqrt{1001}}{198198}\, J\,(560)$$

$$(d_2\, f_3 |\, d_2\, f_3) = \frac{9}{28}\, J\,(111) - \frac{\sqrt{14}}{14}\, J\,(131) + \frac{\sqrt{55}}{154}\, J\,(151) + \frac{1}{18}\, J\,(331) -$$

$$- \frac{\sqrt{770}}{1386}\, J\,(351) + \frac{5}{2772}\, J\,(551) ,+ \frac{25}{78}\, J\,(555)$$

$$|\,f_0\, f_1) = \frac{\sqrt{35}}{70}\, J\,(121) + \frac{3\sqrt{210}}{308}\, J\,(141) + \frac{25\sqrt{13}}{312}\, J\,(161) - \frac{\sqrt{10}}{90}\, J\,(231) +$$

$$+ \frac{\sqrt{77}}{1386}\, J\,(251) - \frac{\sqrt{15}}{66}\, J\,(341) - \frac{25\sqrt{182}}{2808}\, J\,(361) + \frac{5\sqrt{462}}{10164}\, J\,(451) +$$

$$+ \frac{25\sqrt{715}}{30888}\, J\,(561)$$

$$|\,f_1\, f_2) = \frac{\sqrt{21}}{28}\, J\,(121) + \frac{3\sqrt{14}}{77}\, J\,(141) - \frac{5\sqrt{195}}{572}\, J\,(161) - \frac{\sqrt{6}}{36}\, J\,(231) +$$

$$+ \frac{\sqrt{1155}}{2772}\, J\,(251) - \frac{2}{33}\, J\,(341) + \frac{5\sqrt{2730}}{5148}\, J\,(361) + \frac{\sqrt{770}}{2541}\, J\,(451) - \frac{25\sqrt{429}}{56628}\, J\,(561)$$

$$|\,f_2\, f_3) = \frac{\sqrt{35}}{28}\, J\,(121) - \frac{3\sqrt{210}}{308}\, J\,(141) + \frac{5\sqrt{13}}{572}\, J\,(161) - \frac{\sqrt{10}}{36}\, J\,(231) +$$

$$+ \frac{5\sqrt{77}}{2772}\, J\,(251) + \frac{\sqrt{15}}{66}\, J\,(341) - \frac{5\sqrt{182}}{5148}\, J\,(361) - \frac{5\sqrt{462}}{10164}\, J\,(451) +$$

$$+ \frac{5\sqrt{715}}{56628}\, J\,(561) + \frac{25\sqrt{77}}{858}\, J\,(565)$$

$$(f_0\, f_0 |\, f_0\, f_0) = \frac{1}{2}\, J\,(000) + \frac{4\sqrt{5}}{15}\, J\,(020) + \frac{6}{11}\, J\,(040) + \frac{100\sqrt{13}}{429}\, J\,(060) + \frac{8}{45}\, J\,(220) +$$

$$+ \frac{8\sqrt{5}}{55}\, J\,(240) + \frac{80\sqrt{65}}{1287}\, J\,(260) + \frac{18}{121}\, J\,(440) + \frac{200\sqrt{13}}{1573}\, J\,(460) + \frac{5000}{14157}\, J\,(660)$$

$$|\,f_1\, f_1) = \frac{1}{2}\, J\,(000) + \frac{7\sqrt{5}}{30}\, J\,(020) + \frac{7}{22}\, J\,(040) + \frac{25\sqrt{13}}{858}\, J\,(060) + \frac{2}{15}\, J\,(220) +$$

$$+ \frac{\sqrt{5}}{15}\, J\,(240) + \frac{3}{121}\, J\,(440) - \frac{175\sqrt{13}}{4719}\, J\,(460) - \frac{1250}{4719}\, J\,(660)$$

$$|f_2\,f_2) = \frac{1}{2}\,J\,(000) + \frac{2\sqrt{5}}{15}\,J\,(020) - \frac{1}{22}\,J\,(040) + \frac{5\sqrt{13}}{429}\,J\,(060) -$$

$$- \frac{14\sqrt{5}}{165}\,J\,(240) - \frac{21}{121}\,J\,(440) + \frac{4\sqrt{65}}{429}\,J\,(260) - \frac{260\sqrt{13}}{4719}\,J\,(460) + \frac{500}{4719}\,J\,(660)$$

$$|f_3\,f_3) = \frac{1}{2}\,J\,(000) - \frac{\sqrt{5}}{30}\,J\,(020) + \frac{9}{22}\,J\,(040) + \frac{95\sqrt{13}}{858}\,J\,(060) - \frac{2}{9}\,J\,(220) -$$

$$- \frac{3\sqrt{5}}{55}\,J\,(240) - \frac{52\sqrt{65}}{1287}\,J\,(260) + \frac{9}{121}\,J\,(440) + \frac{45\sqrt{13}}{1573}\,J\,(460) - \frac{250}{14157}\,J\,(660)$$

$$(f_0\,f_1\,|\,f_0\,f_1) = \frac{1}{45}\,J\,(221) + \frac{\sqrt{6}}{33}\,J\,(241) + \frac{5\sqrt{455}}{702}\,J\,(261) + \frac{15}{242}\,J\,(441) +$$

$$+ \frac{25\sqrt{2730}}{5148}\,J\,(461) + \frac{4375}{16848}\,J\,(661)$$

$$|f_1\,f_2) = \frac{\sqrt{15}}{90}\,J\,(221) + \frac{23\sqrt{10}}{660}\,J\,(241) + \frac{215\sqrt{273}}{30888}\,J\,(261) + \frac{2\sqrt{15}}{121}\,J\,(441) +$$

$$+ \frac{325\sqrt{182}}{56628}\,J\,(461) - \frac{875\sqrt{15}}{30888}\,J\,(661)$$

$$|f_2\,f_3) = \frac{1}{18}\,J\,(221) + \frac{\sqrt{6}}{44}\,J\,(241) - \frac{287\sqrt{455}}{30888}\,J\,(261) - \frac{15}{242}\,J\,(441) -$$

$$- \frac{245\sqrt{2730}}{113256}\,J\,(461) + \frac{875}{30888}\,J\,(661)$$

$$(f_0\,f_2\,|\,f_0\,f_2) = \frac{2}{9}\,J\,(222) + \frac{2\sqrt{3}}{33}\,J\,(242) - \frac{4\sqrt{182}}{117}\,J\,(262) + \frac{3}{242}\,J\,(442) -$$

$$- \frac{2\sqrt{546}}{429}\,J\,(462) + \frac{28}{117}\,J\,(662)$$

$$|f_1\,f_1) = -\frac{2\sqrt{15}}{45}\,J\,(222) - \frac{13\sqrt{5}}{165}\,J\,(242) - \frac{\sqrt{2730}}{2145}\,J\,(262) - \frac{\sqrt{15}}{121}\,J\,(442) +$$

$$+ \frac{29\sqrt{910}}{9438}\,J\,(462) + \frac{70\sqrt{15}}{1287}\,J\,(662)$$

$$|f_1\,f_3) = \frac{1}{9}\,J\,(222) - \frac{5\sqrt{3}}{66}\,J\,(242) - \frac{2\sqrt{182}}{429}\,J\,(262) - \frac{9}{242}\,J\,(442) +$$

$$+ \frac{71\sqrt{546}}{9438}\,J\,(462) - \frac{70}{1287}\,J\,(662)$$

$$(f_0 f_3 \,|\, f_0 f_3) = \frac{63}{242} J\,(443) - \frac{210\sqrt{39}}{4719} J\,(463) + \frac{350}{4719} J\,(663)$$

$$|\, f_1 f_2) = -\frac{21}{242} J\,(443) - \frac{245\sqrt{39}}{9438} J\,(463) + \frac{175}{1573} J\,(663)$$

$$(f_1 f_1 \,|\, f_1 f_1) = \frac{1}{2} J\,(000) + \frac{\sqrt{5}}{5} J\,(020) + \frac{1}{11} J\,(040) - \frac{25\sqrt{13}}{143} J\,(060) + \frac{1}{10} J\,(220) +$$

$$+ \frac{2}{15} J\,(222) + \frac{\sqrt{5}}{55} J\,(240) + \frac{4\sqrt{3}}{33} J\,(242) - \frac{5\sqrt{65}}{143} J\,(260) + \frac{10\sqrt{182}}{429} J\,(262) +$$

$$+ \frac{1}{242} J\,(440) + \frac{10}{121} J\,(442) - \frac{25\sqrt{13}}{1573} J\,(460) + \frac{625}{3146} J\,(660) +$$

$$+ \frac{50\sqrt{546}}{4719} J\,(462) + \frac{875}{4719} J\,(662)$$

$$|\, f_1 f_3) = -\frac{\sqrt{15}}{45} J\,(222) + \frac{4\sqrt{5}}{165} J\,(242) - \frac{7\sqrt{2730}}{2574} J\,(262) + \frac{3\sqrt{15}}{121} J\,(442) +$$

$$+ \frac{35\sqrt{910}}{9438} J\,(462) - \frac{175\sqrt{15}}{14157} J\,(662)$$

$$|\, f_2 f_2) = \frac{1}{2} J\,(000) + \frac{\sqrt{5}}{10} J\,(020) - \frac{3}{11} J\,(040) - \frac{15\sqrt{13}}{286} J\,(060) - \frac{7\sqrt{5}}{110} J\,(240) -$$

$$- \frac{7}{242} J\,(440) + \frac{\sqrt{65}}{143} J\,(260) + \frac{185\sqrt{13}}{3146} J\,(460) - \frac{125}{1573} J\,(660)$$

$$|\, f_3 f_3) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{15} J\,(020) + \frac{2}{11} J\,(040) - \frac{40\sqrt{13}}{429} J\,(060) - \frac{1}{6} J\,(220) +$$

$$+ \frac{2\sqrt{5}}{165} J\,(240) + \frac{4\sqrt{65}}{143} J\,(260) + \frac{3}{242} J\,(440) + \frac{125}{9438} J\,(660) - \frac{115\sqrt{13}}{4719} J\,(460)$$

$$(f_1 f_2 \,|\, f_1 f_2) = \frac{1}{12} J\,(221) + \frac{2\sqrt{6}}{33} J\,(241) - \frac{5\sqrt{455}}{858} J\,(261) + \frac{8}{121} J\,(441) -$$

$$- \frac{10\sqrt{2730}}{4719} J\,(461) + \frac{7}{242} J\,(443) + \frac{35\sqrt{39}}{1573} J\,(463) + \frac{875}{18876} J\,(661) + \frac{525}{3146} J\,(663)$$

$$|\, f_2 f_3) = \frac{\sqrt{15}}{36} J\,(221) + \frac{\sqrt{10}}{132} J\,(241) - \frac{5\sqrt{273}}{1287} J\,(261) - \frac{2\sqrt{15}}{121} J\,(441) +$$

$$+ \frac{95\sqrt{182}}{18876} J\,(461) - \frac{175\sqrt{15}}{56628} J\,(661)$$

$$(f_1 f_2 \,|\, f_1 f_2) = \frac{1}{18} J\,(222) - \frac{\sqrt{3}}{11} J\,(242) + \frac{5\sqrt{182}}{1287} J\,(262) + \frac{27}{242} J\,(442) -$$

$$- \frac{5\sqrt{546}}{1573} J\,(462) + \frac{21}{242} J\,(444) - \frac{35\sqrt{65}}{1573} J\,(464) + \frac{175}{14157} J\,(662) +$$

$$+ \frac{875}{9438} J\,(664)$$

$$|\, f_2 f_2) = - \frac{7\sqrt{15}}{242} J\,(444) - \frac{35\sqrt{39}}{9438} J\,(464) + \frac{175\sqrt{15}}{4719} J\,(664)$$

$$(f_2 f_2 \,|\, f_2 f_2) = \frac{1}{2} J\,(000) - \frac{7}{11} J\,(040) + \frac{10\sqrt{13}}{143} J\,(060) + \frac{49}{242} J\,(440) + \frac{35}{242} J\,(444) -$$

$$- \frac{70\sqrt{13}}{1573} J\,(460) + \frac{70\sqrt{65}}{1573} J\,(464) + \frac{50}{1573} J\,(660) + \frac{350}{1573} J\,(664)$$

$$|\, f_3 f_3) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{6} J\,(020) - \frac{2}{11} J\,(040) + \frac{25\sqrt{13}}{858} J\,(060) + \frac{7\sqrt{5}}{66} J\,(240) -$$

$$- \frac{5\sqrt{65}}{429} J\,(260) - \frac{21}{242} J\,(440) + \frac{125\sqrt{13}}{9438} J\,(460) - \frac{25}{4719} J\,(660)$$

$$(f_2 f_3 \,|\, f_2 f_3) = \frac{5}{36} J\,(221) - \frac{5\sqrt{6}}{66} J\,(241) + \frac{5\sqrt{455}}{2574} J\,(261) + \frac{15}{242} J\,(441) -$$

$$- \frac{5\sqrt{2730}}{9438} J\,(461) + \frac{175}{56628} J\,(661) + \frac{1925}{9438} J\,(665)$$

$$(f_3 f_3 \,|\, f_3 f_3) = \frac{1}{2} J\,(000) - \frac{\sqrt{5}}{3} J\,(020) + \frac{3}{11} J\,(040) - \frac{5\sqrt{13}}{429} J\,(060) + \frac{5}{18} J\,(220) -$$

$$- \frac{\sqrt{5}}{11} J\,(240) + \frac{5\sqrt{65}}{1287} J\,(260) + \frac{9}{242} J\,(440) - \frac{5\sqrt{13}}{1573} J\,(460) + \frac{25}{28314} J\,(660) +$$

$$+ \frac{175}{429} J\,(666)$$