Kinetic Sorption Model

eigen function, (3.14)

$E\_s = \text{ka } s \cosh(\sqrt{s}) + \sqrt{s}\,\sinh(\sqrt{s})\,(\text{kd} + s)$

moments in the Laplace space, (3.13)

$$\text{m0\_hat} = \frac{\text{kd}\,\sinh(\sqrt{s}) - \text{ka}\,\sinh(\sqrt{s}) + s\,\sinh(\sqrt{s}) + \text{ka}\,\sqrt{s}\,\cosh(\sqrt{s})}{\sqrt{s}\,(\text{ka } s \cosh(\sqrt{s}) + \sqrt{s}\,\sinh(\sqrt{s})\,(\text{kd} + s))}$$

$\text{m1\_hat} =$

$$\Big(\text{Pe}\,\big(8\,s^3\,\sigma_1 - 48\,\text{ka } s - 48\,\text{ka}^2\,s - 16\,\text{kd}\,s^2 - 8\,\text{kd}^2\,s - 48\,\text{ka}\,\text{kd} - 8\,s^3 + 16\,\text{ka}^2\,s^2 - 42\,\text{ka}^2\,s\,\sigma_1 + 16\,\text{kd}\,s^2\,\sigma_1$$

$$+ 8\,\text{kd}^2\,s\,\sigma_1 - 48\,\text{ka}\,s^{3/2}\,\sigma_2 + 16\,\text{ka}\,s^{5/2}\,\sigma_2 + 8\,\text{ka}^2\,s^2\,\sigma_1 + 45\,\text{ka}^2\,\sqrt{s}\,\sigma_2 + 48\,\text{ka}\,\text{kd}\,\sigma_1 + 48\,\text{ka}\,s\,\sigma_1$$

$$- 48\,\text{ka}\,\text{kd}\,\sqrt{s}\,\sigma_2 + 16\,\text{ka}\,\text{kd}\,s^{3/2}\,\sigma_2\big)\Big)\Big/\Big(8\,s^3\,\big(\text{ka}^2\,s - 2\,\text{kd}\,s + \text{kd}^2\,\sigma_1 + s^2\,\sigma_1 - \text{kd}^2 - s^2 + \text{ka}^2\,s\,\sigma_1 + 2\,\text{ka}\,s^{3/2}\,\sigma_2$$

$$+ 2\,\text{kd}\,s\,\sigma_1 + 2\,\text{ka}\,\text{kd}\,\sqrt{s}\,\sigma_2\big)\Big)$$

where

$$\sigma_1 = \cosh(2\,\sqrt{s})$$

$$\sigma_2 = \sinh(2\,\sqrt{s})$$

$\text{m2\_hat} =$

$$\Big(320\,s^6\,\sigma_1 - 960\,s^6\,\sinh(\sqrt{s}) - 2880\,\text{Pe}^2\,s^{7/2}\,\cosh(\sqrt{s}) + 8640\,\text{Pe}^2\,\text{kd}^3\,\sinh(\sqrt{s}) + 8640\,\text{Pe}^2\,s^3\,\sinh(\sqrt{s})$$

$$+ 2880\,\text{Pe}^2\,s^4\,\sinh(\sqrt{s}) - 1152\,\text{Pe}^2\,s^5\,\sinh(\sqrt{s}) + 960\,\text{ka}\,s^{11/2}\,\sigma_2 + 1120\,\text{ka}^2\,s^{9/2}\,\cosh(\sqrt{s})$$

$$+ 1600\,\text{ka}^3\,s^{9/2}\,\cosh(\sqrt{s}) - 640\,\text{ka}\,s^5\,\sigma_1 + 1600\,\text{ka}^2\,s^5\,\sinh(\sqrt{s}) - 480\,\text{ka}^3\,s^4\,\sinh(\sqrt{s}) + 960\,\text{kd}\,s^5\,\sigma_1$$

$$- 2880\,\text{kd}^2\,s^4\,\sinh(\sqrt{s}) - 960\,\text{kd}^3\,s^3\,\sinh(\sqrt{s}) + 2880\,\text{Pe}^2\,s^{7/2}\,\sigma_2 - 2880\,\text{Pe}^2\,\text{kd}^3\,\sigma_1 - 2880\,\text{Pe}^2\,s^3\,\sigma_1$$

$$- 960\,\text{Pe}^2\,s^4\,\sigma_1 + 384\,\text{Pe}^2\,s^5\,\sigma_1 - 1120\,\text{ka}^2\,s^{9/2}\,\sigma_2 + 320\,\text{ka}^3\,s^{9/2}\,\sigma_2 + 960\,\text{ka}^2\,s^5\,\sigma_1 - 480\,\text{ka}^3\,s^4\,\sigma_1$$

$$+ 960\,\text{kd}^2\,s^4\,\sigma_1 + 320\,\text{kd}^3\,s^3\,\sigma_1 - 960\,\text{ka}\,s^{11/2}\,\cosh(\sqrt{s}) + 1920\,\text{ka}\,s^5\,\sinh(\sqrt{s}) - 2880\,\text{kd}\,s^5\,\sinh(\sqrt{s})$$

$$- 640\,\text{ka}\,\text{kd}^2\,s^3\,\sigma_1 + 960\,\text{ka}^2\,\text{kd}\,s^4\,\sigma_1 - 1920\,\text{ka}\,\text{kd}\,s^{9/2}\,\cosh(\sqrt{s}) - \frac{170415\,\text{Pe}^2\,\text{ka}^2\,s^{3/2}\,\sigma_2}{2} + 40950\,\text{Pe}^2\,\text{ka}^3\,s^{3/2}\,\sigma_2$$

$$- 20970\,\text{Pe}^2\,\text{ka}^2\,s^{5/2}\,\sigma_2 - 960\,\text{Pe}^2\,\text{ka}^3\,s^{5/2}\,\sigma_2 + 384\,\text{Pe}^2\,\text{ka}^3\,s^{7/2}\,\sigma_2 + 2880\,\text{Pe}^2\,\text{kd}^3\,\sqrt{s}\,\sigma_2 + 8640\,\text{Pe}^2\,\text{kd}^2\,s^{3/2}\,\sigma_2$$

$$+ 3840\,\text{ka}\,\text{kd}\,s^4\,\sinh(\sqrt{s}) + 81810\,\text{Pe}^2\,\text{ka}^2\,s^2\,\sigma_1 - 2880\,\text{Pe}^2\,\text{ka}^2\,s^3\,\sigma_1 - 11070\,\text{Pe}^2\,\text{ka}^3\,s^2\,\sigma_1 + 1152\,\text{Pe}^2\,\text{ka}^2\,s^4\,\sigma_1$$

$$- 2880\,\text{Pe}^2\,\text{kd}^2\,s^2\,\sigma_1 + 1152\,\text{Pe}^2\,\text{kd}^2\,s^3\,\sigma_1 + 384\,\text{Pe}^2\,\text{kd}^3\,s^2\,\sigma_1 - 38160\,\text{Pe}^2\,\text{ka}\,s^{5/2}\,\cosh(\sqrt{s})$$

$$+ 2880\,\text{Pe}^2\,\text{ka}\,s^{7/2}\,\cosh(\sqrt{s}) - 1152\,\text{Pe}^2\,\text{ka}\,s^{9/2}\,\cosh(\sqrt{s}) - 8640\,\text{Pe}^2\,\text{kd}\,s^{5/2}\,\cosh(\sqrt{s})$$

$$+ 129600\,\text{Pe}^2\,\text{ka}\,\text{kd}^2\,\sinh(\sqrt{s}) + 129600\,\text{Pe}^2\,\text{ka}\,s^2\,\sinh(\sqrt{s}) + 41760\,\text{Pe}^2\,\text{ka}\,s^3\,\sinh(\sqrt{s}) - \frac{84105\,\text{Pe}^2\,\text{ka}^3\,s\,\sinh(\sqrt{s})}{2}$$

$$- 3840\, Pe^2\, ka\, s^4\, \sinh(\sqrt{s}) + 25920\, Pe^2\, kd\, s^2\, \sinh(\sqrt{s}) + 25920\, Pe^2\, kd^2\, s\, \sinh(\sqrt{s}) + 8640\, Pe^2\, kd\, s^3\, \sinh(\sqrt{s})$$

$$+ 2880\, Pe^2\, kd^3\, s\, \sinh(\sqrt{s}) - 3456\, Pe^2\, kd\, s^4\, \sinh(\sqrt{s}) + 1920\, ka\, kd\, s^{9/2}\, \sigma_2 - 960\, ka\, kd^2\, s^{7/2}\, \cosh(\sqrt{s})$$

$$+ 1120\, ka^2\, kd\, s^{7/2}\, \cosh(\sqrt{s}) - 1280\, ka\, kd\, s^4\, \sigma_1 + 1920\, ka\, kd^2\, s^3\, \sinh(\sqrt{s}) + 1600\, ka^2\, kd\, s^4\, \sinh(\sqrt{s})$$

$$+ 38160\, Pe^2\, ka\, s^{5/2}\, \sigma_2 - 2880\, Pe^2\, ka\, s^{7/2}\, \sigma_2 + 1152\, Pe^2\, ka\, s^{9/2}\, \sigma_2 + \frac{170415\, Pe^2\, ka^2\, s^{3/2}\, \cosh(\sqrt{s})}{2}$$

$$+ 127260\, Pe^2\, ka^3\, s^{3/2}\, \cosh(\sqrt{s}) + 29790\, Pe^2\, ka^2\, s^{5/2}\, \cosh(\sqrt{s}) - 6600\, Pe^2\, ka^3\, s^{5/2}\, \cosh(\sqrt{s})$$

$$- 3360\, Pe^2\, ka^2\, s^{7/2}\, \cosh(\sqrt{s}) + 1344\, Pe^2\, ka^3\, s^{7/2}\, \cosh(\sqrt{s}) + 320\, Pe^2\, ka^2\, s^{9/2}\, \cosh(\sqrt{s}) + 8640\, Pe^2\, kd\, s^{5/2}\, \sigma_2$$

$$- 2880\, Pe^2\, kd^3\, \sqrt{s}\, \cosh(\sqrt{s}) - 8640\, Pe^2\, kd^2\, s^{3/2}\, \cosh(\sqrt{s}) - 43200\, Pe^2\, ka\, kd^2\, \sigma_1 - 43200\, Pe^2\, ka\, s^2\, \sigma_1$$

$$- 7200\, Pe^2\, ka\, s^3\, \sigma_1 - \frac{84105\, Pe^2\, ka^3\, s\, \sigma_1}{2} + 86580\, Pe^2\, ka^2\, s^2\, \sinh(\sqrt{s}) - 7080\, Pe^2\, ka^2\, s^3\, \sinh(\sqrt{s})$$

$$- 10890\, Pe^2\, ka^3\, s^2\, \sinh(\sqrt{s}) + 1344\, Pe^2\, ka^2\, s^4\, \sinh(\sqrt{s}) - 480\, Pe^2\, ka^3\, s^3\, \sinh(\sqrt{s}) + 320\, Pe^2\, ka^3\, s^4\, \sinh(\sqrt{s})$$

$$- 8640\, Pe^2\, kd\, s^2\, \sigma_1 - 8640\, Pe^2\, kd^2\, s\, \sigma_1 - 2880\, Pe^2\, kd\, s^3\, \sigma_1 - 960\, Pe^2\, kd^3\, s\, \sigma_1 + 1152\, Pe^2\, kd\, s^4\, \sigma_1$$

$$+ 8640\, Pe^2\, kd^2\, s^2\, \sinh(\sqrt{s}) - 3456\, Pe^2\, kd^2\, s^3\, \sinh(\sqrt{s}) - 1152\, Pe^2\, kd^3\, s^2\, \sinh(\sqrt{s}) + 960\, ka\, kd^2\, s^{7/2}\, \sigma_2$$

$$- 1120\, ka^2\, kd\, s^{7/2}\, \sigma_2 + 76320\, Pe^2\, ka\, kd\, s^{3/2}\, \sigma_2 - 5760\, Pe^2\, ka\, kd\, s^{5/2}\, \sigma_2 + 2304\, Pe^2\, ka\, kd\, s^{7/2}\, \sigma_2$$

$$- 38160\, Pe^2\, ka\, kd^2\, \sqrt{s}\, \cosh(\sqrt{s}) + \frac{170415\, Pe^2\, ka^2\, kd\, \sqrt{s}\, \cosh(\sqrt{s})}{2} + 2880\, Pe^2\, ka\, kd^2\, s^{3/2}\, \cosh(\sqrt{s})$$

$$+ 29790\, Pe^2\, ka^2\, kd\, s^{3/2}\, \cosh(\sqrt{s}) - 1152\, Pe^2\, ka\, kd^2\, s^{5/2}\, \cosh(\sqrt{s}) - 3360\, Pe^2\, ka^2\, kd\, s^{5/2}\, \cosh(\sqrt{s})$$

$$+ 320\, Pe^2\, ka^2\, kd\, s^{7/2}\, \cosh(\sqrt{s}) - 14400\, Pe^2\, ka\, kd\, s^2\, \sigma_1 - 7200\, Pe^2\, ka\, kd^2\, s\, \sigma_1 + 81810\, Pe^2\, ka^2\, kd\, s\, \sigma_1$$

$$- 3840\, Pe^2\, ka\, kd^2\, s^2\, \sinh(\sqrt{s}) - 7080\, Pe^2\, ka^2\, kd\, s^2\, \sinh(\sqrt{s}) + 1344\, Pe^2\, ka^2\, kd\, s^3\, \sinh(\sqrt{s})$$

$$+ 259200\, Pe^2\, ka\, kd\, s\, \sinh(\sqrt{s}) + 38160\, Pe^2\, ka\, kd^2\, \sqrt{s}\, \sigma_2 - \frac{170415\, Pe^2\, ka^2\, kd\, \sqrt{s}\, \sigma_2}{2} - 2880\, Pe^2\, ka\, kd^2\, s^{3/2}\, \sigma_2$$

$$- 20970\, Pe^2\, ka^2\, kd\, s^{3/2}\, \sigma_2 + 1152\, Pe^2\, ka\, kd^2\, s^{5/2}\, \sigma_2 - 2880\, Pe^2\, ka^2\, kd\, s^2\, \sigma_1 + 1152\, Pe^2\, ka^2\, kd\, s^3\, \sigma_1$$

$$- 76320\, Pe^2\, ka\, kd\, s^{3/2}\, \cosh(\sqrt{s}) + 5760\, Pe^2\, ka\, kd\, s^{5/2}\, \cosh(\sqrt{s}) - 2304\, Pe^2\, ka\, kd\, s^{7/2}\, \cosh(\sqrt{s})$$

$$- 86400\, Pe^2\, ka\, kd\, s\, \sigma_1 + 83520\, Pe^2\, ka\, kd\, s^2\, \sinh(\sqrt{s}) + 41760\, Pe^2\, ka\, kd^2\, s\, \sinh(\sqrt{s})$$

$$+ 86580\, Pe^2\, ka^2\, kd\, s\, \sinh(\sqrt{s}) - 7680\, Pe^2\, ka\, kd\, s^3\, \sinh(\sqrt{s})\Bigg) \bigg/ \Bigg(640\, s^5$$

$$\Big(kd^3\, \sigma_3 + s^3\, \sigma_3 + 3\, ka\, s^{5/2}\, \sigma_4 + 3\, ka^2\, s^2\, \sinh(\sqrt{s}) + 3\, kd\, s^2\, \sigma_3 + 3\, kd^2\, s\, \sigma_3 + ka^3\, s^{3/2}\, \sigma_4 + 3\, ka^2\, s^2\, \sigma_3$$

$$- 3\, ka\, s^{5/2}\, \cosh(\sqrt{s}) - 6\, ka\, kd\, s^{3/2}\, \cosh(\sqrt{s}) + 3\, ka^2\, kd\, s\, \sinh(\sqrt{s}) - 3\, ka\, kd^2\, \sqrt{s}\, \cosh(\sqrt{s}) + 6\, ka\, kd\, s^{3/2}\, \sigma_4$$

$$+ 3\, ka^2\, kd\, s\, \sigma_3 + 3\, ka\, kd^2\, \sqrt{s}\, \sigma_4\Big)\Bigg)$$

where

$$\sigma_1 = \sinh(3\, \sqrt{s})$$

$$\sigma_2 = \cosh(3\, \sqrt{s})$$

$$\sigma_3 = \sinh(\sqrt{s})^3$$

$$\sigma_4 = \cosh(\sqrt{s})^3$$

coefficents (3.20)
(Note that the expressions for zeroth-order terms can't be recovered by setting p_k = 0 in the solution for ak, bk1, bk2, ck1, ck2, ck3 because in deriving the general solution, we have used ka/(p_k^2 - kd) = tan(p_k)/p_k, which is not valid for p_k = 0.)

$$a_0 = \frac{kd}{ka + kd}$$

$$a_k = \frac{2\,ka^2}{ka^2\,p_k^2 + ka\,kd + ka\,p_k^2 + kd^2 - 2\,kd\,p_k^2 + p_k^4}$$

$$b_0^{(1)} = \frac{2\,Pe\,ka\,kd\,(6\,ka + kd + 15)}{15\,(ka + kd)^3}$$

$b_k^{(1)} =$
$$-\Big(Pe\,ka\,\big(-6\,ka^5\,p_k^6 + 15\,ka^5\,p_k^4 + 16\,ka^4\,kd\,p_k^4 + 51\,ka^4\,kd\,p_k^2 - 24\,ka^4\,p_k^6 + 30\,ka^4\,p_k^4 - 8\,ka^3\,kd^2\,p_k^4$$
$$+ 93\,ka^3\,kd^2\,p_k^2 + 30\,ka^3\,kd^2 + 24\,ka^3\,kd\,p_k^6 - 96\,ka^3\,kd\,p_k^4 + 51\,ka^3\,kd\,p_k^2 - 16\,ka^3\,p_k^8 + 3\,ka^3\,p_k^6$$
$$+ 15\,ka^3\,p_k^4 + 40\,ka^2\,kd^3\,p_k^2 + 84\,ka^2\,kd^3 - 128\,ka^2\,kd^2\,p_k^4 - 51\,ka^2\,kd^2\,p_k^2 + 136\,ka^2\,kd\,p_k^6 - 54\,ka^2\,kd\,p_k^4$$
$$- 48\,ka^2\,p_k^8 + 21\,ka^2\,p_k^6 - 2\,ka\,kd^4\,p_k^2 + 78\,ka\,kd^4 + 16\,ka\,kd^3\,p_k^4 - 222\,ka\,kd^3\,p_k^2 - 36\,ka\,kd^2\,p_k^6$$
$$+ 198\,ka\,kd^2\,p_k^4 + 32\,ka\,kd\,p_k^8 - 42\,ka\,kd\,p_k^6 - 10\,ka\,p_k^{10} - 12\,ka\,p_k^8 + 24\,kd^5 - 120\,kd^4\,p_k^2 + 240\,kd^3\,p_k^4$$
$$- 240\,kd^2\,p_k^6 + 120\,kd\,p_k^8 - 24\,p_k^{10}\big)\Big)\Big/\Big(2\,p_k^4\,\big(ka^2\,p_k^2 + ka\,kd + ka\,p_k^2 + kd^2 - 2\,kd\,p_k^2 + p_k^4\big)^3\Big)$$

$$b_0^{(2)} = \frac{Pe\,kd^2}{(ka + kd)^2}$$

$$b_k^{(2)} = \frac{Pe\,ka^2\,\big(4\,ka^2\,p_k^4 + 3\,ka^2\,p_k^2 - 3\,ka\,kd + 3\,ka\,p_k^2 + 4\,kd^2\,p_k^2 - 3\,kd^2 - 8\,kd\,p_k^4 + 6\,kd\,p_k^2 + 4\,p_k^6 - 3\,p_k^4\big)}{2\,p_k^2\,\big(ka^2\,p_k^2 + ka\,kd + ka\,p_k^2 + kd^2 - 2\,kd\,p_k^2 + p_k^4\big)^2}$$

$$c_0^{(1)} = \big(kd\,(1824\,Pe^2\,ka^4 - 620\,Pe^2\,ka^3\,kd + 8100\,Pe^2\,ka^3 - 418\,Pe^2\,ka^2\,kd^2 - 5220\,Pe^2\,ka^2\,kd + 9450\,Pe^2\,ka^2$$
$$- 80\,Pe^2\,ka\,kd^3 - 720\,Pe^2\,ka\,kd^2 - 9450\,Pe^2\,ka\,kd - 6\,Pe^2\,kd^4 + 2100\,ka^4 + 4200\,ka^3\,kd + 6300\,ka^3$$
$$+ 2100\,ka^2\,kd^2 + 12600\,ka^2\,kd + 6300\,ka\,kd^2)\big)\big/\big(1575\,(ka + kd)^5\big)$$

$c_k^{(1)} =$
$$-\big(-280\,Pe^2\,ka^{10}\,p_k^{12} + 7530\,Pe^2\,ka^{10}\,p_k^{10} - 16875\,Pe^2\,ka^{10}\,p_k^8 + 2632\,Pe^2\,ka^9\,kd\,p_k^{10} + 15810\,Pe^2\,ka^9\,kd\,p_k^8$$
$$- 74925\,Pe^2\,ka^9\,kd\,p_k^6 - 2240\,Pe^2\,ka^9\,p_k^{12} + 45180\,Pe^2\,ka^9\,p_k^{10} - 67500\,Pe^2\,ka^9\,p_k^8 - 728\,Pe^2\,ka^8\,kd^2\,p_k^{10}$$
$$+ 42194\,Pe^2\,ka^8\,kd^2\,p_k^8 - 104415\,Pe^2\,ka^8\,kd^2\,p_k^6 - 129195\,Pe^2\,ka^8\,kd^2\,p_k^4 + 2240\,Pe^2\,ka^8\,kd\,p_k^{12}$$
$$- 63176\,Pe^2\,ka^8\,kd\,p_k^{10} + 243210\,Pe^2\,ka^8\,kd\,p_k^8 - 224775\,Pe^2\,ka^8\,kd\,p_k^6 - 1352\,Pe^2\,ka^8\,p_k^{14}$$
$$+ 26630\,Pe^2\,ka^8\,p_k^{12} + 36135\,Pe^2\,ka^8\,p_k^{10} - 101250\,Pe^2\,ka^8\,p_k^8 + 10560\,Pe^2\,ka^7\,kd^3\,p_k^8$$
$$+ 31032\,Pe^2\,ka^7\,kd^3\,p_k^6 - 357540\,Pe^2\,ka^7\,kd^3\,p_k^4 - 97605\,Pe^2\,ka^7\,kd^3\,p_k^2 - 30968\,Pe^2\,ka^7\,kd^2\,p_k^{10}$$

$$+ 126894\, Pe^2\, ka^7\, kd^2\, {p_k}^8 + 259095\, Pe^2\, ka^7\, kd^2\, {p_k}^6 - 258390\, Pe^2\, ka^7\, kd^2\, {p_k}^4 + 30352\, Pe^2\, ka^7\, kd\, {p_k}^{12}$$

$$- 302148\, Pe^2\, ka^7\, kd\, {p_k}^{10} + 401640\, Pe^2\, ka^7\, kd\, {p_k}^8 - 224775\, Pe^2\, ka^7\, kd\, {p_k}^6 - 9624\, Pe^2\, ka^7\, {p_k}^{14}$$

$$+ 156030\, Pe^2\, ka^7\, {p_k}^{12} - 87375\, Pe^2\, ka^7\, {p_k}^{10} - 67500\, Pe^2\, ka^7\, {p_k}^8 - 664\, Pe^2\, ka^6\, kd^4\, {p_k}^8 + 76490\, Pe^2\, ka^6\, kd^4\, {p_k}^6$$

$$- 292545\, Pe^2\, ka^6\, kd^4\, {p_k}^4 - 380835\, Pe^2\, ka^6\, kd^4\, {p_k}^2 - 27000\, Pe^2\, ka^6\, kd^4 + 4368\, Pe^2\, ka^6\, kd^3\, {p_k}^{10}$$

$$- 253884\, Pe^2\, ka^6\, kd^3\, {p_k}^8 + 1031610\, Pe^2\, ka^6\, kd^3\, {p_k}^6 - 78210\, Pe^2\, ka^6\, kd^3\, {p_k}^4 - 97605\, Pe^2\, ka^6\, kd^3\, {p_k}^2$$

$$- 9280\, Pe^2\, ka^6\, kd^2\, {p_k}^{12} + 309992\, Pe^2\, ka^6\, kd^2\, {p_k}^{10} - 981810\, Pe^2\, ka^6\, kd^2\, {p_k}^8 + 560160\, Pe^2\, ka^6\, kd^2\, {p_k}^6$$

$$- 129195\, Pe^2\, ka^6\, kd^2\, {p_k}^4 + 8112\, Pe^2\, ka^6\, kd\, {p_k}^{14} - 165636\, Pe^2\, ka^6\, kd\, {p_k}^{12} + 67530\, Pe^2\, ka^6\, kd\, {p_k}^{10}$$

$$+ 136890\, Pe^2\, ka^6\, kd\, {p_k}^8 - 74925\, Pe^2\, ka^6\, kd\, {p_k}^6 - 2536\, Pe^2\, ka^6\, {p_k}^{16} + 33038\, Pe^2\, ka^6\, {p_k}^{14} + 182895\, Pe^2\, ka^6\, {p_k}^{12}$$

$$- 140085\, Pe^2\, ka^6\, {p_k}^{10} - 16875\, Pe^2\, ka^6\, {p_k}^8 + 15704\, Pe^2\, ka^5\, kd^5\, {p_k}^6 - 18978\, Pe^2\, ka^5\, kd^5\, {p_k}^4$$

$$- 551895\, Pe^2\, ka^5\, kd^5\, {p_k}^2 - 133920\, Pe^2\, ka^5\, kd^5 - 78752\, Pe^2\, ka^5\, kd^4\, {p_k}^8 + 330660\, Pe^2\, ka^5\, kd^4\, {p_k}^6$$

$$+ 1250160\, Pe^2\, ka^5\, kd^4\, {p_k}^4 - 147285\, Pe^2\, ka^5\, kd^4\, {p_k}^2 + 159120\, Pe^2\, ka^5\, kd^3\, {p_k}^{10} - 1061244\, Pe^2\, ka^5\, kd^3\, {p_k}^8$$

$$- 285450\, Pe^2\, ka^5\, kd^3\, {p_k}^6 + 176130\, Pe^2\, ka^5\, kd^3\, {p_k}^4 - 160608\, Pe^2\, ka^5\, kd^2\, {p_k}^{12} + 1403760\, Pe^2\, ka^5\, kd^2\, {p_k}^{10}$$

$$- 958260\, Pe^2\, ka^5\, kd^2\, {p_k}^8 + 196650\, Pe^2\, ka^5\, kd^2\, {p_k}^6 + 80344\, Pe^2\, ka^5\, kd\, {p_k}^{14} - 851538\, Pe^2\, ka^5\, kd\, {p_k}^{12}$$

$$+ 531705\, Pe^2\, ka^5\, kd\, {p_k}^{10} - 37350\, Pe^2\, ka^5\, kd\, {p_k}^8 - 15808\, Pe^2\, ka^5\, {p_k}^{16} + 197340\, Pe^2\, ka^5\, {p_k}^{14}$$

$$+ 13740\, Pe^2\, ka^5\, {p_k}^{12} - 54225\, Pe^2\, ka^5\, {p_k}^{10} - 264\, Pe^2\, ka^4\, kd^6\, {p_k}^6 + 55446\, Pe^2\, ka^4\, kd^6\, {p_k}^4$$

$$- 344325\, Pe^2\, ka^4\, kd^6\, {p_k}^2 - 267120\, Pe^2\, ka^4\, kd^6 + 2656\, Pe^2\, ka^4\, kd^5\, {p_k}^8 - 290352\, Pe^2\, ka^4\, kd^5\, {p_k}^6$$

$$+ 1660530\, Pe^2\, ka^4\, kd^5\, {p_k}^4 + 374895\, Pe^2\, ka^4\, kd^5\, {p_k}^2 - 10120\, Pe^2\, ka^4\, kd^4\, {p_k}^{10} + 620502\, Pe^2\, ka^4\, kd^4\, {p_k}^8$$

$$- 2988345\, Pe^2\, ka^4\, kd^4\, {p_k}^6 + 346545\, Pe^2\, ka^4\, kd^4\, {p_k}^4 + 19200\, Pe^2\, ka^4\, kd^3\, {p_k}^{12} - 688752\, Pe^2\, ka^4\, kd^3\, {p_k}^{10}$$

$$+ 2263140\, Pe^2\, ka^4\, kd^3\, {p_k}^8 - 604890\, Pe^2\, ka^4\, kd^3\, {p_k}^6 - 19480\, Pe^2\, ka^4\, kd^2\, {p_k}^{14} + 415074\, Pe^2\, ka^4\, kd^2\, {p_k}^{12}$$

$$- 292095\, Pe^2\, ka^4\, kd^2\, {p_k}^{10} - 35550\, Pe^2\, ka^4\, kd^2\, {p_k}^8 + 10144\, Pe^2\, ka^4\, kd\, {p_k}^{16} - 126816\, Pe^2\, ka^4\, kd\, {p_k}^{14}$$

$$- 488550\, Pe^2\, ka^4\, kd\, {p_k}^{12} + 227835\, Pe^2\, ka^4\, kd\, {p_k}^{10} - 2136\, Pe^2\, ka^4\, {p_k}^{18} + 14898\, Pe^2\, ka^4\, {p_k}^{16}$$

$$+ 189645\, Pe^2\, ka^4\, {p_k}^{14} - 41715\, Pe^2\, ka^4\, {p_k}^{12} + 10176\, Pe^2\, ka^3\, kd^7\, {p_k}^4 - 65880\, Pe^2\, ka^3\, kd^7\, {p_k}^2$$

$$- 269280\, Pe^2\, ka^3\, kd^7 - 72744\, Pe^2\, ka^3\, kd^6\, {p_k}^6 + 527130\, Pe^2\, ka^3\, kd^6\, {p_k}^4 + 1046745\, Pe^2\, ka^3\, kd^6\, {p_k}^2$$

$$+ 223824\, Pe^2\, ka^3\, kd^5\, {p_k}^8 - 1752420\, Pe^2\, ka^3\, kd^5\, {p_k}^6 - 1276560\, Pe^2\, ka^3\, kd^5\, {p_k}^4 - 383160\, Pe^2\, ka^3\, kd^4\, {p_k}^{10}$$

$$+ 3163350\, Pe^2\, ka^3\, kd^4\, {p_k}^8 + 58005\, Pe^2\, ka^3\, kd^4\, {p_k}^6 + 393120\, Pe^2\, ka^3\, kd^3\, {p_k}^{12} - 3366000\, Pe^2\, ka^3\, kd^3\, {p_k}^{10}$$

$$+ 1023480\, Pe^2\, ka^3\, kd^3\, {p_k}^8 - 241176\, Pe^2\, ka^3\, kd^2\, {p_k}^{14} + 2118630\, Pe^2\, ka^3\, kd^2\, {p_k}^{12} - 699165\, Pe^2\, ka^3\, kd^2\, {p_k}^{10}$$

$$+ 81744\, Pe^2\, ka^3\, kd\, {p_k}^{16} - 732180\, Pe^2\, ka^3\, kd\, {p_k}^{14} + 83160\, Pe^2\, ka^3\, kd\, {p_k}^{12} - 11784\, Pe^2\, ka^3\, {p_k}^{18}$$

$$+ 107370\, Pe^2\, ka^3\, {p_k}^{16} + 33615\, Pe^2\, ka^3\, {p_k}^{14} - 48\, Pe^2\, ka^2\, kd^8\, {p_k}^4 + 12180\, Pe^2\, ka^2\, kd^8\, {p_k}^2 - 139320\, Pe^2\, ka^2\, kd^8$$

$$+ 528\, Pe^2\, ka^2\, kd^7\, {p_k}^6 - 85980\, Pe^2\, ka^2\, kd^7\, {p_k}^4 + 882090\, Pe^2\, ka^2\, kd^7\, {p_k}^2 - 2832\, Pe^2\, ka^2\, kd^6\, {p_k}^8$$

$$+ 259620\, Pe^2\, ka^2\, kd^6\, {p_k}^6 - 2307060\, Pe^2\, ka^2\, kd^6\, {p_k}^4 + 8592\, Pe^2\, ka^2\, kd^5\, {p_k}^{10} - 434220\, Pe^2\, ka^2\, kd^5\, {p_k}^8$$

$$+ 3120390\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^5\,p_k^6 - 15600\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^4\,p_k^{12} + 433500\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^4\,p_k^{10} - 2116800\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^4\,p_k^8$$

$$+ 17328\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^3\,p_k^{14} - 256980\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^3\,p_k^{12} + 333270\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^3\,p_k^{10} - 11568\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^2\,p_k^{16}$$

$$+ 82380\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^2\,p_k^{14} + 480060\ \text{Pe}^2\,\text{ka}^2\,\text{kd}^2\,p_k^{12} + 4272\ \text{Pe}^2\,\text{ka}^2\,\text{kd}\,p_k^{18} - 10020\ \text{Pe}^2\,\text{ka}^2\,\text{kd}\,p_k^{16}$$

$$- 312390\ \text{Pe}^2\,\text{ka}^2\,\text{kd}\,p_k^{14} - 672\ \text{Pe}^2\,\text{ka}^2\,p_k^{20} - 480\ \text{Pe}^2\,\text{ka}^2\,p_k^{18} + 59760\ \text{Pe}^2\,\text{ka}^2\,p_k^{16} + 2400\ \text{Pe}^2\,\text{ka}\,\text{kd}^9\,p_k^2$$

$$- 31680\ \text{Pe}^2\,\text{ka}\,\text{kd}^9 - 22560\ \text{Pe}^2\,\text{ka}\,\text{kd}^8\,p_k^4 + 274320\ \text{Pe}^2\,\text{ka}\,\text{kd}^8\,p_k^2 + 94080\ \text{Pe}^2\,\text{ka}\,\text{kd}^7\,p_k^6$$

$$- 1054080\ \text{Pe}^2\,\text{ka}\,\text{kd}^7\,p_k^4 - 228480\ \text{Pe}^2\,\text{ka}\,\text{kd}^6\,p_k^8 + 2358720\ \text{Pe}^2\,\text{ka}\,\text{kd}^6\,p_k^6 + 356160\ \text{Pe}^2\,\text{ka}\,\text{kd}^5\,p_k^{10}$$

$$- 3386880\ \text{Pe}^2\,\text{ka}\,\text{kd}^5\,p_k^8 - 369600\ \text{Pe}^2\,\text{ka}\,\text{kd}^4\,p_k^{12} + 3235680\ \text{Pe}^2\,\text{ka}\,\text{kd}^4\,p_k^{10} + 255360\ \text{Pe}^2\,\text{ka}\,\text{kd}^3\,p_k^{14}$$

$$- 2056320\ \text{Pe}^2\,\text{ka}\,\text{kd}^3\,p_k^{12} - 113280\ \text{Pe}^2\,\text{ka}\,\text{kd}^2\,p_k^{16} + 838080\ \text{Pe}^2\,\text{ka}\,\text{kd}^2\,p_k^{14} + 29280\ \text{Pe}^2\,\text{ka}\,\text{kd}\,p_k^{18}$$

$$- 198720\ \text{Pe}^2\,\text{ka}\,\text{kd}\,p_k^{16} - 3360\ \text{Pe}^2\,\text{ka}\,p_k^{20} + 20880\ \text{Pe}^2\,\text{ka}\,p_k^{18} - 1440\ \text{Pe}^2\,\text{kd}^{10} + 14400\ \text{Pe}^2\,\text{kd}^9\,p_k^2$$

$$- 64800\ \text{Pe}^2\,\text{kd}^8\,p_k^4 + 172800\ \text{Pe}^2\,\text{kd}^7\,p_k^6 - 302400\ \text{Pe}^2\,\text{kd}^6\,p_k^8 + 362880\ \text{Pe}^2\,\text{kd}^5\,p_k^{10} - 302400\ \text{Pe}^2\,\text{kd}^4\,p_k^{12}$$

$$+ 172800\ \text{Pe}^2\,\text{kd}^3\,p_k^{14} - 64800\ \text{Pe}^2\,\text{kd}^2\,p_k^{16} + 14400\ \text{Pe}^2\,\text{kd}\,p_k^{18} - 1440\ \text{Pe}^2\,p_k^{20} + 800\ \text{ka}^9\,\text{kd}\,p_k^{12}$$

$$+ 320\ \text{ka}^8\,\text{kd}^2\,p_k^{12} + 2080\ \text{ka}^8\,\text{kd}^2\,p_k^{10} - 320\ \text{ka}^8\,\text{kd}\,p_k^{14} + 2400\ \text{ka}^8\,\text{kd}\,p_k^{12} + 3040\ \text{ka}^7\,\text{kd}^3\,p_k^{10}$$

$$+ 1760\ \text{ka}^7\,\text{kd}^3\,p_k^8 - 4800\ \text{ka}^7\,\text{kd}^2\,p_k^{12} + 4160\ \text{ka}^7\,\text{kd}^2\,p_k^{10} + 1760\ \text{ka}^7\,\text{kd}\,p_k^{14} + 2400\ \text{ka}^7\,\text{kd}\,p_k^{12}$$

$$+ 960\ \text{ka}^6\,\text{kd}^4\,p_k^{10} + 4480\ \text{ka}^6\,\text{kd}^4\,p_k^8 + 480\ \text{ka}^6\,\text{kd}^4\,p_k^6 - 2880\ \text{ka}^6\,\text{kd}^3\,p_k^{12} - 3200\ \text{ka}^6\,\text{kd}^3\,p_k^{10}$$

$$+ 1760\ \text{ka}^6\,\text{kd}^3\,p_k^8 + 2880\ \text{ka}^6\,\text{kd}^2\,p_k^{14} - 5760\ \text{ka}^6\,\text{kd}^2\,p_k^{12} + 2080\ \text{ka}^6\,\text{kd}^2\,p_k^{10} - 960\ \text{ka}^6\,\text{kd}\,p_k^{16}$$

$$+ 4480\ \text{ka}^6\,\text{kd}\,p_k^{14} + 800\ \text{ka}^6\,\text{kd}\,p_k^{12} + 3680\ \text{ka}^5\,\text{kd}^5\,p_k^8 + 1760\ \text{ka}^5\,\text{kd}^5\,p_k^6 - 12160\ \text{ka}^5\,\text{kd}^4\,p_k^{10}$$

$$+ 640\ \text{ka}^5\,\text{kd}^4\,p_k^8 + 14400\ \text{ka}^5\,\text{kd}^3\,p_k^{12} - 4160\ \text{ka}^5\,\text{kd}^3\,p_k^{10} - 7040\ \text{ka}^5\,\text{kd}^2\,p_k^{14} - 640\ \text{ka}^5\,\text{kd}^2\,p_k^{12}$$

$$+ 1120\ \text{ka}^5\,\text{kd}\,p_k^{16} + 2400\ \text{ka}^5\,\text{kd}\,p_k^{14} + 960\ \text{ka}^4\,\text{kd}^6\,p_k^8 + 2400\ \text{ka}^4\,\text{kd}^6\,p_k^6 - 4800\ \text{ka}^4\,\text{kd}^5\,p_k^{10}$$

$$- 6240\ \text{ka}^4\,\text{kd}^5\,p_k^8 + 9600\ \text{ka}^4\,\text{kd}^4\,p_k^{12} + 2240\ \text{ka}^4\,\text{kd}^4\,p_k^{10} - 9600\ \text{ka}^4\,\text{kd}^3\,p_k^{14} + 6720\ \text{ka}^4\,\text{kd}^3\,p_k^{12}$$

$$+ 4800\ \text{ka}^4\,\text{kd}^2\,p_k^{16} - 7200\ \text{ka}^4\,\text{kd}^2\,p_k^{14} - 960\ \text{ka}^4\,\text{kd}\,p_k^{18} + 2080\ \text{ka}^4\,\text{kd}\,p_k^{16} + 1440\ \text{ka}^3\,\text{kd}^7\,p_k^6$$

$$- 7360\ \text{ka}^3\,\text{kd}^6\,p_k^8 + 15200\ \text{ka}^3\,\text{kd}^5\,p_k^{10} - 16000\ \text{ka}^3\,\text{kd}^4\,p_k^{12} + 8800\ \text{ka}^3\,\text{kd}^3\,p_k^{14} - 2240\ \text{ka}^3\,\text{kd}^2\,p_k^{16}$$

$$+ 160\ \text{ka}^3\,\text{kd}\,p_k^{18} + 320\ \text{ka}^2\,\text{kd}^8\,p_k^6 - 2240\ \text{ka}^2\,\text{kd}^7\,p_k^8 + 6720\ \text{ka}^2\,\text{kd}^6\,p_k^{10} - 11200\ \text{ka}^2\,\text{kd}^5\,p_k^{12}$$

$$+ 11200\ \text{ka}^2\,\text{kd}^4\,p_k^{14} - 6720\ \text{ka}^2\,\text{kd}^3\,p_k^{16} + 2240\ \text{ka}^2\,\text{kd}^2\,p_k^{18} - 320\ \text{ka}^2\,\text{kd}\,p_k^{20}\Big) \Big/ \Big(40\,p_k^8$$

$$\left(\text{ka}^2\,p_k^2 + \text{ka}\,\text{kd} + \text{ka}\,p_k^2 + \text{kd}^2 - 2\,\text{kd}\,p_k^2 + p_k^4\right)^5\Big)$$

$$c_0^{(2)} = \frac{2\,\text{kd}^2\left(135\ \text{Pe}^2\,\text{ka}^2 + 32\ \text{Pe}^2\,\text{ka}\,\text{kd} + 315\ \text{Pe}^2\,\text{ka} + 2\ \text{Pe}^2\,\text{kd}^2 + 105\ \text{ka}^2 + 210\ \text{ka}\,\text{kd} + 105\ \text{kd}^2\right)}{105\,(\text{ka} + \text{kd})^4}$$

$$c_k^{(2)} =$$

$$\Big(\text{ka}\ \big(232\ \text{Pe}^2\,\text{ka}^7\,p_k^{10} - 270\ \text{Pe}^2\,\text{ka}^7\,p_k^8 - 765\ \text{Pe}^2\,\text{ka}^7\,p_k^6 - 776\ \text{Pe}^2\,\text{ka}^6\,\text{kd}\,p_k^8 - 3450\ \text{Pe}^2\,\text{ka}^6\,\text{kd}\,p_k^6$$

$$- 1755\ \text{Pe}^2\,\text{ka}^6\,\text{kd}\,p_k^4 + 904\ \text{Pe}^2\,\text{ka}^6\,p_k^{10} + 450\ \text{Pe}^2\,\text{ka}^6\,p_k^8 - 2295\ \text{Pe}^2\,\text{ka}^6\,p_k^6 + 536\ \text{Pe}^2\,\text{ka}^5\,\text{kd}^2\,p_k^8$$

$$- 4458\, \mathrm{Pe}^2\, \mathrm{ka}^5\, \mathrm{kd}^2\, p_k^{\,6} - 5025\, \mathrm{Pe}^2\, \mathrm{ka}^5\, \mathrm{kd}^2\, p_k^{\,4} + 1035\, \mathrm{Pe}^2\, \mathrm{ka}^5\, \mathrm{kd}^2\, p_k^{\,2} - 1392\, \mathrm{Pe}^2\, \mathrm{ka}^5\, \mathrm{kd}\, p_k^{\,10}$$

$$+ 4404\, \mathrm{Pe}^2\, \mathrm{ka}^5\, \mathrm{kd}\, p_k^{\,8} - 210\, \mathrm{Pe}^2\, \mathrm{ka}^5\, \mathrm{kd}\, p_k^{\,6} - 3510\, \mathrm{Pe}^2\, \mathrm{ka}^5\, \mathrm{kd}\, p_k^{\,4} + 856\, \mathrm{Pe}^2\, \mathrm{ka}^5\, p_k^{\,12} - 138\, \mathrm{Pe}^2\, \mathrm{ka}^5\, p_k^{\,10}$$

$$+ 1035\, \mathrm{Pe}^2\, \mathrm{ka}^5\, p_k^{\,8} - 2295\, \mathrm{Pe}^2\, \mathrm{ka}^5\, p_k^{\,6} - 2432\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}^3\, p_k^{\,6} - 8160\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}^3\, p_k^{\,4} + 1980\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}^3\, p_k^{\,2}$$

$$+ 1485\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}^3 + 7872\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}^2\, p_k^{\,8} + 12720\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}^2\, p_k^{\,6} - 9540\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}^2\, p_k^{\,4}$$

$$+ 1035\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}^2\, p_k^{\,2} - 8128\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}\, p_k^{\,10} - 5280\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}\, p_k^{\,8} + 7920\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}\, p_k^{\,6}$$

$$- 1755\, \mathrm{Pe}^2\, \mathrm{ka}^4\, \mathrm{kd}\, p_k^{\,4} + 2688\, \mathrm{Pe}^2\, \mathrm{ka}^4\, p_k^{\,12} + 720\, \mathrm{Pe}^2\, \mathrm{ka}^4\, p_k^{\,10} - 360\, \mathrm{Pe}^2\, \mathrm{ka}^4\, p_k^{\,8} - 765\, \mathrm{Pe}^2\, \mathrm{ka}^4\, p_k^{\,6}$$

$$+ 376\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^4\, p_k^{\,6} - 7578\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^4\, p_k^{\,4} - 615\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^4\, p_k^{\,2} + 5175\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^4 - 2144\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^3\, p_k^{\,8}$$

$$+ 22440\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^3\, p_k^{\,6} - 5100\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^3\, p_k^{\,4} - 7020\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^3\, p_k^{\,2} + 4176\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^2\, p_k^{\,10}$$

$$- 22044\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^2\, p_k^{\,8} + 14790\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^2\, p_k^{\,6} - 2160\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}^2\, p_k^{\,4} - 3424\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}\, p_k^{\,12}$$

$$+ 7080\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}\, p_k^{\,10} - 11820\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}\, p_k^{\,8} + 4680\, \mathrm{Pe}^2\, \mathrm{ka}^3\, \mathrm{kd}\, p_k^{\,6} + 1016\, \mathrm{Pe}^2\, \mathrm{ka}^3\, p_k^{\,14} + 102\, \mathrm{Pe}^2\, \mathrm{ka}^3\, p_k^{\,12}$$

$$+ 2745\, \mathrm{Pe}^2\, \mathrm{ka}^3\, p_k^{\,10} - 675\, \mathrm{Pe}^2\, \mathrm{ka}^3\, p_k^{\,8} - 2616\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^5\, p_k^{\,4} - 3990\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^5\, p_k^{\,2} + 6615\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^5$$

$$+ 13528\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^4\, p_k^{\,6} + 11190\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^4\, p_k^{\,4} - 22185\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^4\, p_k^{\,2} - 27632\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^3\, p_k^{\,8}$$

$$- 9180\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^3\, p_k^{\,6} + 25650\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^3\, p_k^{\,4} + 27888\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^2\, p_k^{\,10} + 300\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^2\, p_k^{\,8}$$

$$- 9990\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}^2\, p_k^{\,6} - 13912\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}\, p_k^{\,12} + 2130\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}\, p_k^{\,10} - 1305\, \mathrm{Pe}^2\, \mathrm{ka}^2\, \mathrm{kd}\, p_k^{\,8}$$

$$+ 2744\, \mathrm{Pe}^2\, \mathrm{ka}^2\, p_k^{\,14} - 450\, \mathrm{Pe}^2\, \mathrm{ka}^2\, p_k^{\,12} + 1215\, \mathrm{Pe}^2\, \mathrm{ka}^2\, p_k^{\,10} + 72\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^6\, p_k^{\,4} - 3390\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^6\, p_k^{\,2}$$

$$+ 3645\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^6 - 752\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^5\, p_k^{\,6} + 16980\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^5\, p_k^{\,4} - 19170\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^5\, p_k^{\,2} + 2680\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^4\, p_k^{\,8}$$

$$- 34050\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^4\, p_k^{\,6} + 41175\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^4\, p_k^{\,4} - 4640\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^3\, p_k^{\,10} + 34200\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^3\, p_k^{\,8}$$

$$- 45900\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^3\, p_k^{\,6} + 4280\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^2\, p_k^{\,12} - 17250\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^2\, p_k^{\,10} + 27675\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}^2\, p_k^{\,8}$$

$$- 2032\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}\, p_k^{\,14} + 3540\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}\, p_k^{\,12} - 8370\, \mathrm{Pe}^2\, \mathrm{ka}\, \mathrm{kd}\, p_k^{\,10} + 392\, \mathrm{Pe}^2\, \mathrm{ka}\, p_k^{\,16} - 30\, \mathrm{Pe}^2\, \mathrm{ka}\, p_k^{\,14}$$

$$+ 945\, \mathrm{Pe}^2\, \mathrm{ka}\, p_k^{\,12} - 960\, \mathrm{Pe}^2\, \mathrm{kd}^7\, p_k^{\,2} + 720\, \mathrm{Pe}^2\, \mathrm{kd}^7 + 6720\, \mathrm{Pe}^2\, \mathrm{kd}^6\, p_k^{\,4} - 5040\, \mathrm{Pe}^2\, \mathrm{kd}^6\, p_k^{\,2} - 20160\, \mathrm{Pe}^2\, \mathrm{kd}^5\, p_k^{\,6}$$

$$+ 15120\, \mathrm{Pe}^2\, \mathrm{kd}^5\, p_k^{\,4} + 33600\, \mathrm{Pe}^2\, \mathrm{kd}^4\, p_k^{\,8} - 25200\, \mathrm{Pe}^2\, \mathrm{kd}^4\, p_k^{\,6} - 33600\, \mathrm{Pe}^2\, \mathrm{kd}^3\, p_k^{\,10} + 25200\, \mathrm{Pe}^2\, \mathrm{kd}^3\, p_k^{\,8}$$

$$+ 20160\, \mathrm{Pe}^2\, \mathrm{kd}^2\, p_k^{\,12} - 15120\, \mathrm{Pe}^2\, \mathrm{kd}^2\, p_k^{\,10} - 6720\, \mathrm{Pe}^2\, \mathrm{kd}\, p_k^{\,14} + 5040\, \mathrm{Pe}^2\, \mathrm{kd}\, p_k^{\,12} + 960\, \mathrm{Pe}^2\, p_k^{\,16} - 720\, \mathrm{Pe}^2\, p_k^{\,14}$$

$$+ 160\, \mathrm{ka}^7\, p_k^{\,12} + 160\, \mathrm{ka}^6\, \mathrm{kd}\, p_k^{\,10} + 480\, \mathrm{ka}^6\, p_k^{\,12} + 480\, \mathrm{ka}^5\, \mathrm{kd}^2\, p_k^{\,10} - 160\, \mathrm{ka}^5\, \mathrm{kd}^2\, p_k^{\,8} - 960\, \mathrm{ka}^5\, \mathrm{kd}\, p_k^{\,12}$$

$$+ 320\, \mathrm{ka}^5\, \mathrm{kd}\, p_k^{\,10} + 480\, \mathrm{ka}^5\, p_k^{\,14} + 480\, \mathrm{ka}^5\, p_k^{\,12} + 320\, \mathrm{ka}^4\, \mathrm{kd}^3\, p_k^{\,8} - 160\, \mathrm{ka}^4\, \mathrm{kd}^3\, p_k^{\,6} + 320\, \mathrm{ka}^4\, \mathrm{kd}^2\, p_k^{\,10}$$

$$- 160\, \mathrm{ka}^4\, \mathrm{kd}^2\, p_k^{\,8} - 1600\, \mathrm{ka}^4\, \mathrm{kd}\, p_k^{\,12} + 160\, \mathrm{ka}^4\, \mathrm{kd}\, p_k^{\,10} + 960\, \mathrm{ka}^4\, p_k^{\,14} + 160\, \mathrm{ka}^4\, p_k^{\,12} + 480\, \mathrm{ka}^3\, \mathrm{kd}^4\, p_k^{\,8}$$

$$- 160\, \mathrm{ka}^3\, \mathrm{kd}^4\, p_k^{\,6} - 1920\, \mathrm{ka}^3\, \mathrm{kd}^3\, p_k^{\,10} + 640\, \mathrm{ka}^3\, \mathrm{kd}^3\, p_k^{\,8} + 2880\, \mathrm{ka}^3\, \mathrm{kd}^2\, p_k^{\,12} - 320\, \mathrm{ka}^3\, \mathrm{kd}^2\, p_k^{\,10}$$

$$- 1920\, \mathrm{ka}^3\, \mathrm{kd}\, p_k^{\,14} - 640\, \mathrm{ka}^3\, \mathrm{kd}\, p_k^{\,12} + 480\, \mathrm{ka}^3\, p_k^{\,16} + 480\, \mathrm{ka}^3\, p_k^{\,14} + 160\, \mathrm{ka}^2\, \mathrm{kd}^5\, p_k^{\,6} - 160\, \mathrm{ka}^2\, \mathrm{kd}^4\, p_k^{\,8}$$

$$- 960\, \mathrm{ka}^2\, \mathrm{kd}^3\, p_k^{\,10} + 2240\, \mathrm{ka}^2\, \mathrm{kd}^2\, p_k^{\,12} - 1760\, \mathrm{ka}^2\, \mathrm{kd}\, p_k^{\,14} + 480\, \mathrm{ka}^2\, p_k^{\,16} + 160\, \mathrm{ka}\, \mathrm{kd}^6\, p_k^{\,6} - 960\, \mathrm{ka}\, \mathrm{kd}^5\, p_k^{\,8}$$

$$+ 2400\, \mathrm{ka}\, \mathrm{kd}^4\, p_k^{\,10} - 3200\, \mathrm{ka}\, \mathrm{kd}^3\, p_k^{\,12} + 2400\, \mathrm{ka}\, \mathrm{kd}^2\, p_k^{\,14} - 960\, \mathrm{ka}\, \mathrm{kd}\, p_k^{\,16} + 160\, \mathrm{ka}\, p_k^{\,18} \Big) \Big/ \Big(40\, p_k^{\,6}$$

$$\left(\mathrm{ka}^2\, p_k^{\,2} + \mathrm{ka}\, \mathrm{kd} + \mathrm{ka}\, p_k^{\,2} + \mathrm{kd}^2 - 2\, \mathrm{kd}\, p_k^{\,2} + p_k^{\,4} \right)^4 \Big)$$

$$c_0^{(3)} = \frac{Pe^2 \, kd^3}{(ka + kd)^3}$$

$$c_k^{(3)} = \frac{Pe^2 \, ka^2 \left(4\, ka^2 \, p_k^{\,4} + 3\, ka^2 \, p_k^{\,2} - 3\, ka\, kd + 3\, ka\, p_k^{\,2} + 4\, kd^2 \, p_k^{\,2} - 3\, kd^2 - 8\, kd\, p_k^{\,4} + 6\, kd\, p_k^{\,2} + 4\, p_k^{\,6} - 3\, p_k^{\,4}\right)^2}{8\, p_k^{\,4} \left(ka^2 \, p_k^{\,2} + ka\, kd + ka\, p_k^{\,2} + kd^2 - 2\, kd\, p_k^{\,2} + p_k^{\,4}\right)^3}$$