$$V_{local}(R;\lambda,A,a) = \frac{2m}{\hbar^2} N^{-1}\left[C_2(A-1)\left(\frac{(2\pi)^{\frac{A-1}{2}}}{|M_2|}\right)^{3/2} e^{-\alpha_2^+ R^2} + \frac{(A-1)(A-2)}{2} D_1 \left(\frac{(2\pi)^{\frac{A-1}{2}}}{|M_3|}\right)^{3/2} e^{-\alpha_3^+ R^2} \right]$$

$$\left(\frac{(2\pi)^{3/2}\cdot\frac{\hbar^2}{2m}\,(2\pi)^{(A-1)/2}\,\frac{1}{\sqrt{|M||M|}}}{\langle\phi_A|\hat{P}[\phi_A\delta]\rangle} \right)^3 \Rightarrow \left(\frac{(2\pi)^{A-2}}{|M||M|}\right)^{3/2}$$

$$V_{\underset{\ell}{local}}(E,R,R';\lambda,A,a) = i^{\ell}4\pi N^{-1}\Big[f_1\, R e^{-\gamma_1 R'^2}\left(-R^{-2}\partial_R R^2\partial_R - E + \frac{\ell(\ell+1)}{R^2}\right) R' e^{-\alpha_1 R^2} j_\ell(i\beta_1 RR')$$

$$+\frac{2m}{\hbar^2}\Big(f_2^-\, R e^{-\gamma_2^- R'^2} j_\ell(i\beta_2 RR') R' e^{-\alpha_2^- R^2} + f_3^-\, R e^{-\gamma_3^- R'^2} j_\ell(i\beta_3 RR') R' e^{-\alpha_3^- R^2} \Big)\Big]$$

$$\langle\phi_A|(\hat{V}_3^{\mathrm{com}} + \hat{V}_3^{\mathrm{slow}})\,\hat{P}[\phi_A\,\delta(R-R')]\rangle$$

to be used in:

$$\left(\partial_R^2 - E_{rel} + \frac{\ell(\ell+1)}{R^2}\right)\psi_{\ell m}(R) = \hat{V}_{local}(R)\,\psi_{\ell m}(R) + \int dR' \left[\hat{V}^{(0)}_{\overline{loc}}(R,R') + E\,\hat{V}^{(1)}_{\overline{loc}}(R,R')\right]\psi_{\ell m}(R')$$

$$\Leftrightarrow \left[\left(\partial_R^2 + \frac{\ell(\ell+1)}{R^2} - \hat{V}_{local}\right)\delta(R-R') - \int dR'\,\hat{V}^{(0)}_{\overline{loc}}(R,R')\right]\psi_{\ell m}(R') = E_{rel}\left[\delta(R-R') + \int dR'\,\hat{V}^{(1)}_{\overline{loc}}\right]\psi_{\ell m}(R')$$

$$\equiv \quad H_{RR'}\,\underbrace{\psi_{\ell m}^{R'}}_{=\sum_i c_i f_i} = E\,K_{RR'}\,\psi_{\ell m}^{R'}$$

and $\int dR\, f_j \Rightarrow c_i\, f_j^R\, H_{RR'}\, f_i^{R'} = E\, f_j^R\, K_{RR'}\, f_i^{R'}$