Trial wave function is

$$\psi_T(\boldsymbol{r_1}, \boldsymbol{r_2}) = C \exp\left(-\alpha\omega(r_1^2 + r_2^2)/2\right) \exp\left(\frac{ar_{12}}{1+\beta r_{12}}\right).$$

The local energy is defined as

$$E_L(\boldsymbol{r_1}, \boldsymbol{r_2}) = \frac{1}{\psi_T} H\psi_T.$$

In our case the Hamiltonean is

$$H = \sum_{i=1}^{2} -\frac{1}{2}\nabla_i^2 + \frac{1}{2}\omega^2 r_i^2 + \frac{1}{r_{12}}.$$

The complicated part will be the laplacian.

$$\frac{\partial^2 \psi_T}{\partial x_1^2} = \psi_T \left[\frac{\partial^2}{\partial x_1^2}\left(-\alpha\omega(r_1^2 + r_2^2)/2 + \frac{ar_{12}}{1+\beta r_{12}}\right) + \left(\frac{\partial}{\partial x_1}\left(-\alpha\omega(r_1^2 + r_2^2)/2 + \frac{ar_{12}}{1+\beta r_{12}}\right)\right)^2\right]$$

Note that

$$\frac{\partial}{\partial x_1} - \alpha\omega(r_1^2 + r_2^2)/2 = -\alpha\omega x_1,$$

and

$$\begin{aligned}\frac{\partial}{\partial x_1}\frac{ar_{12}}{1+\beta r_{12}} &= a\left(\frac{1}{1+\beta r_{12}} - \frac{r_{12}\beta}{(1+\beta r_{12})^2}\right)\frac{\partial r_{12}}{\partial x_1} \\ &= \frac{a}{(1+\beta r_{12})^2}\frac{\partial r_{12}}{\partial x_1}.\end{aligned}$$

Now

$$\frac{\partial r_{12}}{\partial x_1} = \frac{\partial}{\partial x_1}\left((x_1 - x_2)^2 + (y_1 - y_2)^2\right)^{\frac{1}{2}} = \frac{x_1 - x_2}{r_{12}}.$$

So

$$\left(\frac{\partial}{\partial x_1}\left(-\alpha\omega(r_1^2 + r_2^2)/2 + \frac{ar_{12}}{1+\beta r_{12}}\right)\right)^2 = \alpha^2\omega^2 x_1^2 - \frac{2\alpha\omega a x_1(x_1 - x_2)}{(1+\beta r_{12})^2 r_{12}} + \frac{a^2(x_1 - x_2)^2}{(1+\beta r_{12})^4 r_{12}^2}.$$

And

$$\frac{\partial^2}{\partial x_1^2}\left(-\alpha\omega(r_1^2 + r_2^2)/2 + \frac{ar_{12}}{1+\beta r_{12}}\right) = -\alpha\omega + \frac{a}{(1+\beta r_{12})^2 r_{12}} - \frac{2a\beta(x_1 - x_2)^2}{(1+\beta r_{12})^3 r_{12}^2} - \frac{a(x_1 - x_2)^2}{(1+\beta r_{12})^2 r_{12}^3}$$

Because the ψ_T is symmetric under $1 \leftrightarrow 2$ and $x \leftrightarrow y$:

$$\frac{1}{\psi_T}\sum_i \nabla_i^2 \psi_T = \alpha\omega(r_1^2 + r_2^2) - 4\alpha\omega + \frac{2a^2}{(1+\beta r_{12})^4} + \frac{4a}{(1+\beta r_{12})^2 r_{12}} - \frac{4a\beta}{(1+\beta r_{12})^3} - \frac{2a}{(1+\beta r_{12})^2 r_{12}} - \frac{2\alpha\omega a r_{12}}{(1+\beta r_{12})^2}$$

and finally:

$$\frac{1}{\psi_T}\sum_i \nabla_i^2 \psi_T = \alpha\omega(r_1^2 + r_2^2) - 4\alpha\omega + \frac{2a}{(1+\beta r_{12})^2}\left[\frac{a}{(1+\beta r_{12})^2} + \frac{1}{r_{12}} - \frac{2\beta}{(1+\beta r_{12})} - \alpha\omega r_{12}\right]$$

Using this expression we have the local energy as

$$E_L(\boldsymbol{r_1}, \boldsymbol{r_2}) = \left[\frac{1}{2}(1-\alpha)\omega(r_1^2 + r_2^2) + 2\alpha\omega\right] - \frac{a}{(1+\beta r_{12})^2}\left[\frac{a}{(1+\beta r_{12})^2} + \frac{1}{r_{12}} - \frac{2\beta}{(1+\beta r_{12})} - \alpha\omega r_{12}\right] + \frac{1}{r_{12}},$$

where the second term is from the Jastrow-factor and the third is the interaction term.