$$\frac{\partial[\mathcal{L}]}{\partial A_k} = 0 \quad ; \quad \frac{\partial[\mathcal{L}]}{\partial \mathcal{L}} = 0$$

$$\begin{cases} \sum_{k=0}^{N-1} A_k \langle \phi_k | H-E | \phi_{k'} \rangle - \mathcal{L} \langle \phi_{k'} | H-E | \Omega_1 \rangle = -\langle \phi_{k'} | H-E | \Omega_0 \rangle \\ \quad (k' = 0, \ldots, N-1) \\ \sum_{k=0}^{N-1} A_k \langle \phi_k | H-E | \Omega_1 \rangle - \mathcal{L} \langle \Omega_1 | H-E | \Omega_1 \rangle = \langle \Omega_0 | H-E | \Omega_1 \rangle \end{cases}$$

This is a linear system of $N+1$ eqs. to obtain A_k and $\mathcal{L}$ (first order)

The second order is

$$[\mathcal{L}] = \mathcal{L} - \frac{2}{\det(u)} \langle \Psi^- | H-E | \Psi \rangle$$

with $\Psi^+ = \sum_{k=0}^{N-1} A_k \phi_k(r) + \Omega_0(r) + \mathcal{L}\, \Omega_1(r)$

important : $(H-E) \begin{Bmatrix} \Omega_0(r) \\ \Omega_1(r) \end{Bmatrix} \xrightarrow[r \to \infty]{} 0$