$$\frac{\partial \mathcal{H}_{\mathrm{eff}}(N,\vec{\eta},t)}{\partial \vec{\eta}_k} = \frac{\partial\Big(-iE_0(N)t+\mathcal{H}_{\mathrm{VCN}}(N,\vec{\eta})\Big)}{\partial \vec{\eta}_k}$$

$$\mathcal{H}_{\mathrm{eff}}^{\mathrm{VCN}}(N,\vec{\eta}) = \sum_{n=1}^{\#(\mathrm{var.})} \eta_n^{\mathrm{var.}} \cdot \Phi_n^{\mathrm{var.}}(N) + \sum_{l=0}^{L} \eta_l^{\mathrm{b.e.}} \cdot \Phi_l^{\mathrm{b.e.}}(N) = \sum_l \eta_l \cdot \Phi_l(N)$$

$$\vec{\eta} = \left(\eta_1^{\mathrm{var.}}, \eta_2^{\mathrm{var.}}, \ldots, \eta_{\#(\mathrm{var.})}^{\mathrm{var.}}, \eta_0^{\mathrm{b.e.}}, \eta_1^{\mathrm{b.e.}}, \ldots, \eta_L^{\mathrm{b.e.}}\right)^{\mathrm{T}}$$

$$E_0(N) = U \cdot \sum_m n_{m,\uparrow} n_{m,\downarrow} + \sum_{l,\sigma} \varepsilon_l n_{l,\sigma}$$

$$\eta_l^{\text{b.e.}} = \begin{cases} l = 0 : & -i \cdot U \cdot t \\ l > 0 : & -i \cdot \varepsilon_l \cdot t \end{cases}$$

$$\Phi_l^{\text{b.e.}}(N) = \begin{cases} l = 0 : & \sum_m n_{m,\uparrow} n_{m,\downarrow} \\ l > 0 : & \sum_\sigma n_{l,\sigma} \end{cases}$$