

The linear system is written in compact form

$$\tilde{H} \bar{A} = \bar{b}$$

$\tilde{H}$ is a $(N+1) \times (N+1)$ matrix defined

$$\begin{cases} \langle \phi_k | H - E | \phi_{k'} \rangle & \dots \langle \phi_k | H - E | \Omega_1 \rangle \\ \vdots & \\ \langle \phi_k | H - E | \Omega_1 \rangle & \dots \langle \Omega_1 | H - E | \Omega_1 \rangle \end{cases}$$

$$\bar{A} = \begin{pmatrix} A_0 \\ \vdots \\ A_k \\ \vdots \\ -L \equiv A_N \end{pmatrix}$$

$$\bar{b} = \begin{pmatrix} \vdots \\ -\langle \phi_k | H - E | \Omega_0 \rangle \\ \vdots \\ \langle \Omega_0 | H - E | \Omega_1 \rangle \end{pmatrix}$$

We introduce the unitary matrix $\tilde{T}$

$$\tilde{T} = \begin{pmatrix} T & 0 \\ 0 & 1 \end{pmatrix} \quad (N+1) \times (N+1)$$