A Partition Method for Parallel Processing (simple example) Ax=d, if A is a tridiagonal matrix with order 4

$$A = \begin{bmatrix} b_0 & C_0 \\ a_1 & b_1 & C_1 \\ a_2 & b_2 & C_2 \\ a_3 & b_3 \end{bmatrix}, \text{ assume the number of processors} = 2$$

$$= \begin{bmatrix} b_0 & C_0 \\ a_1 & b_2 & C_2 \\ a_2 & b_2 & C_2 \\ a_3 & b_3 \end{bmatrix}$$
so we have $n = \begin{bmatrix} p & m \\ y & y \\ 4 & 2 & 2 \end{bmatrix}$

how to partition A into submotrices?

$$A = A + \Delta A = \begin{bmatrix} A_0 & C_1 \\ a_2 & A_1 \end{bmatrix} = \begin{bmatrix} A_0 & A_1 \\ A_1 \end{bmatrix} + \begin{bmatrix} C_0 & C_1 & C_2 \\ C_1 & C_2 \\ C_2 & C_3 \end{bmatrix}$$

$$A_0 = \begin{bmatrix} C_0 & C_2 \\ C_1 & C_2 \\ C_2 & C_3 \end{bmatrix}$$

where $A_0 = \begin{bmatrix} b_0 & c_0 \\ a_1 & b_1 \end{bmatrix}$

$$A_{1} = \begin{bmatrix} b_{2} & c_{2} \\ 0_{3} & b_{3} \end{bmatrix}$$

$$\begin{bmatrix} 0 & c_{1} \\ 0 & c_{2} \end{bmatrix} = \begin{bmatrix} 0 & c_{1} \\ 0 & c_{1} \end{bmatrix} \cdot \begin{bmatrix} 0 & 0 & 0 \\ 0 & c_{1} & c_{2} \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & c_{1} & c_{2} \end{bmatrix}$$

$$A_{1} = \begin{bmatrix} b_{2} & C_{2} \\ 0_{3} & b_{3} \end{bmatrix}$$

$$A_{2} = \begin{bmatrix} 0_{2} & e_{2} \\ 0_{2} & e_{2} \end{bmatrix}, C_{1}e_{1} \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & C_{1} \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$V$$

$$E^{T}$$

both V and E are n×2(p-1) matrices Thus we have $A = \widetilde{A} + V E^{T}$