5.2

$A = UDU^T$

$$\left(\begin{array}{c|c} A_{TL} & A_{TR} \\ \hline & A_{BR} \end{array}\right) \rightarrow \left(\begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline x & \alpha_{11} & a_{12}^T \\ \hline x & * & A_{22} \end{array}\right)$$

$$a_{01} := a_{01} / \alpha_{11}$$

$$A_{00} := A_{00} - \alpha_{11} a_{01}$$

$$\left(\begin{array}{c|c|c} A_{FF} & \alpha_{FM} e_L^T & 0 \\ \hline * & \alpha_{MM} & \\ \hline * & \alpha & A_{LL} \end{array}\right) \quad \left(\begin{array}{c|c|c|c} A_{00} & \alpha_{01} e_L & 0 & 0 \\ \hline * & \alpha_{11} & \alpha_{12} & 0 \\ \hline * & * & \alpha_{22} & \alpha_{23} e_F^T \\ \hline * & * & * & A_{33} \end{array}\right)$$

$$\boxed{\begin{aligned} \alpha_{12} &= \alpha_{12} / \alpha_{22} \\ \alpha_{11} &= \alpha_{11} - \alpha_{22} \alpha_{12}^2 \end{aligned}}$$

updating upper triangle

if $UDU^T(A)$

$$a_{01} = a_{01} / \alpha_{11}$$

then UDU^T_{Tri} =

$$\alpha_{12} = \alpha_{12} / \alpha_{22}$$

if $A_{00} := A_{00} - \alpha_{11} a_{01} a_{01}^T$

$$\left(\begin{array}{c|c} A_{00} & \alpha_{01} e_L \\ \hline \star & \alpha_{11} \end{array}\right) := \left(\begin{array}{c|c} A_{00} & \alpha_{01} e_L \\ \hline \star & \alpha_{11} \end{array}\right) - \alpha_{22} \begin{pmatrix} 0 \\ \hline \alpha_{12} \end{pmatrix} \begin{pmatrix} 0 \\ \hline \alpha_{12} \end{pmatrix}^T$$

$$\left(\begin{array}{c|c} A_{00} & \alpha_{01} e_L \\ \hline \times & \alpha_{11} \end{array}\right) - \alpha_{22} \begin{pmatrix} 0 & 0 \\ 0 & \alpha_{12}^2 \end{pmatrix}$$

$$= \begin{pmatrix} A_{00} & \alpha_{01} e_L \\ \star & \alpha_{22} - \alpha_{11} \alpha_{12}^2 \end{pmatrix}$$

then $\boxed{\alpha_{11} = \alpha_{11} - \alpha_{22} \alpha_{12}^2}$

- used the fact that the UDU is moving from lower right corner to upper left corner and that LDL was moving in the opposite direction. So i calculated the values in the opposite way like mirroring the computations along the diagonal.