$$A = \begin{bmatrix} a_0 & b_m & b_m & \cdots & b_m \\ a_1 & a_0 & b_m & \cdots & b_m \\ a_2 & a_1 & a_0 & \cdots & b_m \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_{q-1} & a_{q-2} & a_{q-3} & \cdots & a_0 \end{bmatrix}$$

$$B = \begin{bmatrix} a_q & a_{q-1} & a_{q-2} & \cdots & a_1 \\ b_m & a_q & a_{q-1} & \cdots & a_2 \\ b_m & b_m & a_q & \cdots & a_3 \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ b_m & b_m & b_m & \cdots & a_q \end{bmatrix}$$

Solving

$$CC^* + AB^*(CC^*)^{-1}BA^* = AA^* + BB^*$$

$$C = ?$$