

Consider

$$KQ = K \left[\begin{array}{ccc} \mathbf{q}_1 & \cdots & \mathbf{q}_n \end{array} \right] = \left[\begin{array}{ccc} K\mathbf{q}_1 & \cdots & K\mathbf{q}_n \end{array} \right]$$

and

$$Q\Lambda = \left[\begin{array}{ccc} \left| \right. & & \left| \right. \\ \mathbf{q}_1 & \cdots & \mathbf{q}_n \\ \left| \right. & & \left| \right. \end{array} \right] \left[\begin{array}{ccc} \lambda_1 & & \\ & \ddots & \\ & & \lambda_n \end{array} \right] = \left[\begin{array}{ccc} \lambda_1 \mathbf{q}_1 & \cdots & \lambda_n \mathbf{q}_n \end{array} \right].$$

Therefore $KQ = Q\Lambda$ is equivalent to

$$K\mathbf{q}_i = \lambda_i \mathbf{q}_i$$

for all i .