

$$[\mathbf{C}^\star]^2 = \begin{bmatrix} \overset{(1,1)}{1/3} & \overset{(1,2)}{0} & \overset{(1,3)}{0} & \overset{(2,1)}{0} & \overset{(2,2)}{1/3} & \overset{(2,3)}{0} & \overset{(3,1)}{0} & \overset{(3,2)}{0} & \overset{(3,3)}{1/3} \\ 0 & 1/6 & 1/6 & 1/6 & 0 & 1/6 & 1/6 & 1/6 & 0 \\ 0 & 1/6 & 1/6 & 1/6 & 0 & 1/6 & 1/6 & 1/6 & 0 \\ 0 & 1/6 & 1/6 & 1/6 & 0 & 1/6 & 1/6 & 1/6 & 0 \\ \overset{(1,1)}{1/3} & \overset{(1,2)}{0} & \overset{(1,3)}{0} & \overset{(2,1)}{0} & \overset{(2,2)}{1/3} & \overset{(2,3)}{0} & \overset{(3,1)}{0} & \overset{(3,2)}{0} & \overset{(3,3)}{1/3} \\ 0 & 1/6 & 1/6 & 1/6 & 0 & 1/6 & 1/6 & 1/6 & 0 \\ 0 & 1/6 & 1/6 & 1/6 & 0 & 1/6 & 1/6 & 1/6 & 0 \\ 0 & 1/6 & 1/6 & 1/6 & 0 & 1/6 & 1/6 & 1/6 & 0 \\ \overset{(1,1)}{1/3} & \overset{(1,2)}{0} & \overset{(1,3)}{0} & \overset{(2,1)}{0} & \overset{(2,2)}{1/3} & \overset{(2,3)}{0} & \overset{(3,1)}{0} & \overset{(3,2)}{0} & \overset{(3,3)}{1/3} \end{bmatrix}$$