

ABSTRACT. We consider how to take X such that the linear matrix expression $A - BXC$ attains its maximal and minimal ranks, respectively. As applications, we investigate the rank invariance and the range invariance of $A - BXC$ with respect to the choice of X . In addition, we also give the general solution of the rank equation $\text{rank}(A - BXC) + \text{rank}(BXC) = \text{rank}(A)$ and then determine the minimal rank of $A - BXC$ subject to this equation.