One of well known and much studied nonlinear matrix equation is the matrix polynomial which has the form \( G(X) = A_0 X^m + A_1 X^{m-1} + \cdots + A_m \), where \( A_0, A_1, \cdots, A_m \) and \( X \) are \( n \times n \) real matrices. We show how the minimization methods can be used to solve the matrix polynomial \( G(X) \) and give some numerical experiments. We also compare Polak and Ribiére version and Fletcher and Reeves version of conjugate gradient method.

This is a joint work with Hyun-Min Kim.