

AN ANALYSIS OF THE POLE PLACEMENT PROBLEM. I. THE SINGLE-INPUT CASE *

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Abstract. For the solution of the single-input pole placement problem we derive explicit expressions for the feedback gain matrix as well as the eigenvector matrix of the closed-loop system. Based on these formulas we study the conditioning of the pole-placement problem in terms of perturbations in the data and show how the conditioning depends on the condition number of the closed loop eigenvector matrix, which is similar to a generalized Cauchy matrix, the norm of the feedback vector and the distance to uncontrollability.

Key words. pole placement, condition number, perturbation theory, Jordan form, explicit formulas, Cauchy matrix, stabilization, feedback gain, distance to uncontrollability.

AMS subject classifications. 65F15, 65F35, 65G05, 93B05, 93B55.

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