

POSITIVE DEFINITE SOLUTIONS OF A LINEARLY PERTURBED MATRIX EQUATION*

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Abstract

In this paper we study a special case of linearly perturbed discrete-time algebraic Riccati equation. We give some sufficient conditions for the existence of a positive definite solution of the considered equation. We propose a basic fixed point iteration and its inversion free variant for finding a positive definite solution. Moreover, by specially choosing the initial value in the basic fixed point iteration we prove that it converges to the largest solution. The theoretical results are illustrated by numerical examples.

MSC: 65F10; 15A24

keywords: nonlinear matrix equation, positive definite solution, iterative method

1 Introduction

Consider the nonlinear matrix equation

$$X - A^*XA + B^*X^{-1}B = I, \quad (1)$$

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