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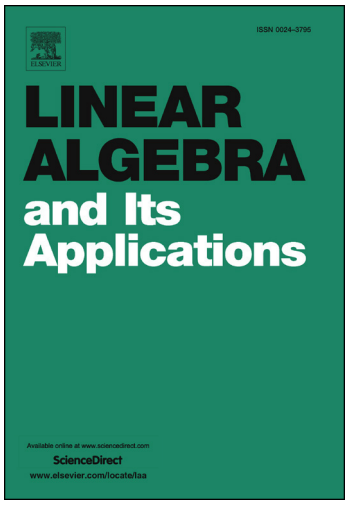

Nonnegative and eventually positive matrices

F. Shakeri, R. Alizadeh

PII: S0024-3795(16)30635-8
DOI: http://dx.doi.org/10.1016/j.laa.2016.12.036
Reference: LAA 13994

To appear in: *Linear Algebra and its Applications*

Received date: 8 December 2016
Accepted date: 28 December 2016

Please cite this article in press as: F. Shakeri, R. Alizadeh, Nonnegative and eventually positive matrices, *Linear Algebra Appl.* (2017), http://dx.doi.org/10.1016/j.laa.2016.12.036

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ACCEPTED MANUSCRIPT

Nonnegative and eventually positive matrices

F. Shakeri *and R. Alizadeh †

Abstract

We characterize those eventually positive matrices A such that the sum of A and every nonnegative matrix remains eventually positive. For $n \geq 3$, we show that for every eventually positive matrix $A \in M_n(\mathbb{R})$, there exists an eventually positive matrix B such that $A + B$ is not eventually positive.

Keywords: Nonnegative matrices, Perron-Frobenius property, eventually positive matrices.

AMS subject classification : 15B48

1 Introduction

Eventually positive (nonnegative) matrices are real matrices whose powers become and remain entrywise positive (nonnegative). These types of matrices have applications in control theory [16] and have been the subject of study in several papers, see [1-5,7,8,9,17,18,19] and the references therein. The class of eventually nonnegative matrices was introduced by Friedland [6], where he characterized the spectrum of such matrices. In [8], authors addressed the Jordan form of irreducible eventually nonnegative matrices. Kirkland et al. [12] introduced and studied the class of algebraically positive matrices, which subsumes the class of eventually positive matrices.

*Department of Applied Mathematics, Faculty of Mathematics and Computer Science, Amirkabir University of Technology, No. 424 Hafez Ave., 15914 Tehran, Iran(f.shakeri@aut.ac.ir)

†Department of Mathematics, Shahed university, P. O. Box:18151-159, Tehran, Iran(alizadeh@shahed.ac.ir)

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