

Accepted Manuscript

Generalization of Roth's solvability criteria to systems of matrix equations

Andrii Dmytryshyn, Vyacheslav Futorny, Tetiana Klymchuk, Vladimir V. Sergeichuk

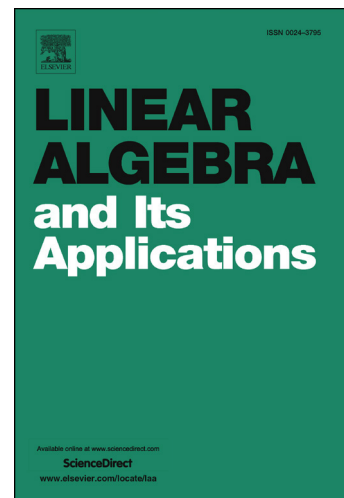
PII: S0024-3795(17)30236-7
DOI: <http://dx.doi.org/10.1016/j.laa.2017.04.011>
Reference: LAA 14120

To appear in: *Linear Algebra and its Applications*

Received date: 11 November 2016
Accepted date: 10 April 2017

Please cite this article in press as: A. Dmytryshyn et al., Generalization of Roth's solvability criteria to systems of matrix equations, *Linear Algebra Appl.* (2017), <http://dx.doi.org/10.1016/j.laa.2017.04.011>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Generalization of Roth's solvability criteria to systems of matrix equations

Andrii Dmytryshyn^a, Vyacheslav Futorny^b, Tetiana Klymchuk^c, Vladimir V. Sergeichuk^{d,*}

^a*Department of Computing Science, Umeå University, Umeå, Sweden*

^b*Department of Mathematics, University of São Paulo, Brazil*

^c*Universitat Politècnica de Catalunya, Barcelona, Spain*

^d*Institute of Mathematics, Kiev, Ukraine*

Abstract

W.E. Roth (1952) proved that the matrix equation $AX - XB = C$ has a solution if and only if the matrices $\begin{bmatrix} A & C \\ 0 & B \end{bmatrix}$ and $\begin{bmatrix} A & 0 \\ 0 & B \end{bmatrix}$ are similar. A. Dmytryshyn and B. Kågström (2015) extended Roth's criterion to systems of matrix equations $A_i X_{i'} M_i - N_i X_{i''} B_i = C_i$ ($i = 1, \dots, s$) with unknown matrices X_1, \dots, X_t , in which every X^σ is X , X^\top , or X^* . We extend their criterion to systems of complex matrix equations that include the complex conjugation of unknown matrices. We also prove an analogous criterion for systems of quaternion matrix equations.

AMS classification: 15A24

Keywords: Systems of matrix equations, Sylvester equations, Roth's criteria

1. Introduction

Roth [15] proved that the matrix equation $AX - XB = C$ (respectively, $AX - YB = C$) over a field has a solution if and only if the matrices $\begin{bmatrix} A & C \\ 0 & B \end{bmatrix}$ and $\begin{bmatrix} A & 0 \\ 0 & B \end{bmatrix}$ are similar (respectively, equivalent); see also [8, Section 4.4.22] and [11, Section 12.5].

*Corresponding author

Email addresses: andrii@cs.umu.se (Andrii Dmytryshyn), futorny@ime.usp.br (Vyacheslav Futorny), tetiana.klymchuk@upc.edu (Tetiana Klymchuk), sergeich@imath.kiev.ua (Vladimir V. Sergeichuk)

Download English Version:

<https://daneshyari.com/en/article/5773394>

Download Persian Version:

<https://daneshyari.com/article/5773394>

[Daneshyari.com](https://daneshyari.com)