

## Accepted Manuscript

On a relationship between the T-congruence Sylvester equation and the Lyapunov equation

Masaya Oozawa, Tomohiro Sogabe, Yuto Miyatake, Shao-Liang Zhang



PII: S0377-0427(17)30297-2

DOI: <http://dx.doi.org/10.1016/j.cam.2017.05.044>

Reference: CAM 11175

To appear in: *Journal of Computational and Applied Mathematics*

Received date: 25 October 2016

Revised date: 30 May 2017

Please cite this article as: M. Oozawa, T. Sogabe, Y. Miyatake, S. Zhang, On a relationship between the T-congruence Sylvester equation and the Lyapunov equation, *Journal of Computational and Applied Mathematics* (2017), <http://dx.doi.org/10.1016/j.cam.2017.05.044>

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.

# On a relationship between the T-congruence Sylvester equation and the Lyapunov equation

Masaya Oozawa, Tomohiro Sogabe\*, Yuto Miyatake,  
Shao-Liang Zhang

*Department of Computational Science and Engineering, Graduate School of Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan*

---

## Abstract

The T-congruence Sylvester equation is the matrix equation  $AX + X^T B = C$ , where  $A \in \mathbb{R}^{m \times n}$ ,  $B \in \mathbb{R}^{n \times m}$  and  $C \in \mathbb{R}^{m \times m}$  are given, and matrix  $X \in \mathbb{R}^{n \times m}$  is to be determined. The T-congruence Sylvester equation has recently attracted attention because of a relationship with palindromic eigenvalue problems. For example, necessary and sufficient conditions for the existence and uniqueness of solutions, and numerical solvers have been intensively studied. In this paper, we will show that, under a certain condition and  $n = m$ , the T-congruence Sylvester equation can be transformed into the Lyapunov equation. This may lead to further properties and efficient numerical solvers by utilizing the rich literature on the Lyapunov equation.

*Key words:* T-congruence Sylvester equation, Lyapunov equation, the tensor product

*AMS subject classifications:* 15A24, 15A69

---

*Dedicated to Professor Ren-Hong Wang on the occasion of his 80-th birthday*

---

\* Corresponding author.

*Email addresses:* m-oozawa@na.nuap.nagoya-u.ac.jp (Masaya Oozawa),  
sogabe@na.nuap.nagoya-u.ac.jp (Tomohiro Sogabe),  
miyatake@na.nuap.nagoya-u.ac.jp (Yuto Miyatake),  
zhang@na.nuap.nagoya-u.ac.jp (Shao-Liang Zhang).

Download English Version:

<https://daneshyari.com/en/article/8902291>

Download Persian Version:

<https://daneshyari.com/article/8902291>

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