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2016 Australian Control Conference, AuCC 2016

1 March 2017, Article number 7868000, Pages 43-47

2016 Australian Control Conference, AuCC 2016; Newcastle; Australia; 3 November 2016 through 4 November 2016; Category number CFP1618M-ART; Code 126715

**Generalized gramian based frequency interval model reduction for unstable systems** (Conference Paper)Jazlan, A.<sup>a</sup>  Sreeram, V.<sup>a</sup>  Togneri, R.<sup>a</sup>  Minh, H.B.<sup>b</sup><sup>a</sup>School of Electrical and Electronics Engineering, University of Western Australia, Dept of Mechatronics Engineering, Faculty of Engineering, IIUM, Kuala Lumpur, Malaysia<sup>b</sup>Faculty of Management Information System, Banking University Ho Chi Minh City, 39 Ham Nghi Street, District 1, Ho Chi Minh City, Viet Nam

## Abstract

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Frequency interval controllability and observability gramian matrices are important in order to understand the characteristics of systems which are inherently frequency dependent. Obtaining these frequency interval controllability and observability gramian matrices requires solving a pair of Lyapunov equations. However for certain systems these Lyapunov equations are not solvable. In addition the eigenvalues of the product of the frequency interval controllability and observability gramians may also be complex numbers and therefore these gramians are not applicable to be used in the context of model reduction. To overcome these issues, generalized frequency interval controllability and observability gramians are introduced in this paper and the applicability of these generalized gramians to be used in model reduction is demonstrated. © 2016 Engineers Australia.

## Author keywords

[Controllability and Observability Gramians](#) [Linear Systems](#) [Lyapunov Equations](#) [Model Order Reduction](#) [Unstable Systems](#)

## Indexed keywords

Engineering controlled terms: [Controllability](#) [Eigenvalues and eigenfunctions](#) [Linear systems](#) [Lyapunov functions](#) [Matrix algebra](#)Compendex keywords: [Controllability and observabilities](#) [Frequency dependent](#) [Frequency intervals](#) [Generalized frequencies](#) [Lyapunov equation](#) [Model order reduction](#) [Model reduction](#) [Unstable system](#)Engineering main heading: [Observability](#)

ISBN: 978-192210790-9

Source Type: Conference Proceeding

Original language: English

DOI: 10.1109/AUCC.2016.7868000

Document Type: Conference Paper

Sponsors:


Publisher: Institute of Electrical and Electronics Engineers Inc.

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