

Structure preserving order reduction of networked linear systems

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Abstract:

The work studies the model order reduction of multi-agent systems consisting of linear subsystems, where the interconnected topology is characterized by an undirected weighted graph. The reduced order system is obtained by either balanced truncation or graph clustering through dissimilarity analysis. The network structure represented by the Laplacian matrix of the network should be preserved, which is particularly challenging in the case of balanced truncation. For both clustering and balanced truncation we will preserve the network structure, and simultaneously discuss the preservation of e.g. second order structure, and certain passivity properties.

Short biography:

Jacquélien Scherpen studied Applied Mathematics at the University of Twente, where she also gained her PhD in 1994 with a thesis entitled Balancing for nonlinear systems. She then went on to work at the TU Delft, after which she became Professor of Discrete Technology and Production Automation at the University of Groningen in 2006. Prof. Scherpen has been Director of the Engineering and Technology Institute Groningen since January 2013.

Her research area covers order reduction methods for nonlinear control systems in order to make control design and implementation feasible for complex nonlinear systems. Furthermore, she studies the design of distributed and often nonlinear controllers for complex applications. Examples of such systems can be found in industry, robotics, micro systems, semi-conductors, energy systems, smart grids and space applications.

Scherpen is currently conducting research on more efficient use and distribution of energy. She recently was awarded two NWO grants for projects looking into sustainable energy systems.