



Lothar-Collatz-Kolloquium für Angewandte Mathematik

Donnerstag, den 13. Juni 2019, um 17:15 Uhr, im Hörsaal 5

Prof. Dr. Wim Michiels*

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A multi-dimensional generalization of the Cayley Hamilton theorem and its application to the H2 norm analysis of delay differential algebraic systems

Zusammenfassung/Abstract:

We present a recursion formula for multi-dimensional powers of a finite set of matrices, which can be interpreted as a natural generalization of the celebrated Cayley Hamilton theorem, and we show how it allows us to solve a problem which bears similarities to the observability problem of a switched linear system. This problem appears in the computation of the H2 norm of a stable system described by a class of linear time-invariant delay differential equations (DDAEs) with multiple delays. The H2 norm of a DDAE may not be finite even if there are seemingly no direct feedthrough terms. We show that necessary and sufficient conditions for a finite H2 norm depend on the rational (in)dependence of the delay values, but that the system can always be transformed into another system with rationally independent delays. The conditions for a finite H2 norm consist of an infinite number of linear equations to be satisfied. We show that using the generalized Cayley-Hamilton theorem checking these conditions can be turned into a check of a finite number of equations. We conclude with some comments on the computation of the H2 norm whenever it is finite and by stating an open problem.

This is joint work with Marco Antonio Gomez Alvarez (KU Leuven) and Raphael Jungers (UCLouvain)

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Die aktuelle Version der Kolloquiumsankündigungen (inkl. Abstracts) finden Sie unter:

<http://www.math.uni-hamburg.de/spag/angmath/kolloq/>