Hamilton Institute

Stability, Passivity and Model Reduction for Differential-Algebraic Equations

Tatjana Stykel

TU Berlin

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Abstract

In this talk we consider stability, passivity and model order reduction for linear differential-algebraic equations (DAEs). Such equations arise in many practical applications including mechanical systems, circuit simulation and fluid dynamics. We show that the asymptotic behavior of the solution of the DAE system can be characterized using projected generalized Lyapunov equations. To establish the passivity of DAEs we can use projected generalized Lur'e and Riccati equations. All these matrix equations play also a significant role in balancing-related model order reduction. We present an extension of the classical balanced truncation and positive real balanced truncation methods to DAEs. Important properties of these methods are that stability and passivity are preserved in the reduced-order system and there exist computable error bounds.

Venue: Seminar Room, Hamilton Institute, Rye Hall, NUI Maynooth

Time: 2.00 - 3.00pm (followed by tea/coffee)

Travel directions are available at www.hamilton.ie

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