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Characterizing and Computing the Stability Region of Singular Nonlinear Dynamical Systems

Tuesday 27 May 2025 15:30 (30 minutes)

In this presentation, we explore the challenge of computing the stability region for a class of singular nonlinear continuous- and discrete-time systems. Under specific conditions, we derive topological properties of the stability region. After providing key characterizations of its boundary, we introduce a practical, direct method for computing this region. The proposed method involves solving an associated eigenvalue problem and performing forward and backward integration of the singular system in question. Numerical examples are included to illustrate the approach. This work extends concepts discussed in the monograph Stability Regions of Nonlinear Dynamical Systems: Theory, Estimation, and Applications (Cambridge University Press, 2015) by H.-D. Chiang and L. F. Alberto.

The talk is based on joint work with Pham Hong Quan and Le Huy Hoang.

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