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Title: Time-Delay Systems: Exploring Stability and Stabilization via MID and CRRID

    Abstract: The stability of time-delay systems represents a long-standing yet ever-evolving research field, standing at the crossroads of analysis, dynamics, and control. From the pioneering works of Lemeray, Hayes, Wright, and Pinney on first-order delay differential equations to the recent developments based on the notions of "Multiplicity-Induced Dominance (MID)" and "Coexistence of Real Roots Inducing Dominance (CRRID)", our understanding of stability and stabilization mechanisms has steadily deepened.

    This talk will trace the evolution of these ideas, highlighting the connections between classical (analytical or geometrical) approaches and modern formulations that provide a unified perspective on stability loss and recovery phenomena. In the scalar case, special emphasis will be placed on the MID and CRRID criteria, first introduced and proved by Boussaada and collaborators, which provide a unified framework for analyzing the characteristic spectrum and formulating stability criteria.

    The presentation will then extend these ideas to systems with two commensurate delays, focusing on planar models as a first step toward partial pole placement. A new result will show how the MID-CRRID framework can be adapted to capture delay interactions and guide stability-oriented design in multi-delay systems.