

TIME DELAY SYSTEMS

Webinar

TDS

2026

## Stability of time-delay systems of neutral type: modeling, sensitivity, and practical implications



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**March 27, 2026, Friday @ 4:00 pm (CET)**

7:00 am (PDT), 11:00 am (EDT), 11:00 pm (CST)

**Event will take place via Zoom**

**ABSTRACT:** The stability of time-delay systems may change upon arbitrarily small change of delay ratios. This fact lies in the core of some well-known phenomena in control systems including sensitivity of Smith predictor under small delay mismatch, well-posedness of systems under direct link, and discrete implementation of distributed feedback stabilization. This point of view permits one to have a unified formulation of these problems. This presentation also discusses effective modeling of time-delay systems of neutral type by coupled differential-difference equations. Ad Hoc method, pulling-out delays, and structured invariant subspace methods are presented to reduce the dimensions of delay channels. Conditions are formulated such that D-decomposition method of stability analysis is also presented.

**BIO:** Dr. Keqin Gu is a Distinguished Research Professor Emeritus of the Department of Mechanical and Mechatronics Engineering, Southern Illinois University Edwardsville (SIUE). His research interest lies in control systems and dynamical systems, especially systems with delays. He authored or co-authored about 150 papers in various journals, book chapters, and conferences.

Dr. Gu served as an associate editor or a member of editorial board in a number of technical journals in control systems field, such as IEEE Transactions on Automatic Control, Automatica, and Systems and Control Letters. He served as program committee member of major control conferences in the control systems area such as Conference on Decision and Control, and American Control Conferences. He also co-organized a number of workshops on time-delay systems, served as the US Coordinator for three US-France international cooperative research projects funded by NSF (US) and CNRS (France). He received IFAC Delay Systems Lifetime Achievement Award in 2025, C. S. Hsu Award in 2025 International Conference on Nonlinear Science and Complexity.

In addition to research oriented services, Dr. Gu also served as the department chair, interim associate dean, and school PhD program director. He is currently a commissioner for ABET Engineering Accreditation Commission.



Questions? Contact: Gabor Orosz, orosz@umich.edu