TIME DELAY SYSTEMS

Webinar TDS

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Time delay algorithms for active vibration suppression - theory and applications

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Event will take place via Zoom

ABSTRACT: Involving time delays in control algorithms proved useful in many aspects of vibration suppression and flexible mode compensation of mechanical systems. This is mainly due to ability to store information on the current half period and act proportionally in a subsequent half period or its multiple to beat vibration. Interestingly, it can be done by a dynamic compensator/controller free of poles, though, with infinitely many zeros. The arising infinite dimensionality of the closed loop dynamics then needs to be considered in the design. After highlighting spectral properties of delay systems/controllers and their frequency domain implications towards vibration suppression, the following applications will be targeted: i) experimental validation of non-collocated vibration absorption by delayed resonator, ii) delayed resonator extension to multi-dimensional vibration absorption, iii) internal model control scheme to suppress periodic disturbance, and iii) theory and validation of optimal input shaping.

BIO: Tomas Vyhlidal (1974) received MSc in Automatic control and engineering informatics in 1998, and Ph.D. in Control and systems engineering in 2003, both from the Faculty of Mechanical Engineering (FME), Czech Technical University (CTU), Prague, Czech Republic. Since 2000, he has been with the Department of Instrumentation and Control Engineering, FME - CTU, professor since 2012 and the department head since 2019. Since 2015, he has also been with the Czech Institute of Informatics, Robotics, and Cybernetics, CTU, where he leads research group Machine and process control. He has been a member of the Technical Committee for Linear Control Systems of IFAC since 2013, vice-chair on industry since 2017. He was IPC chair of two IFAC-TDS workshops (Boston, 2012, and Istanbul 2016). His research interests include analysis and control of time delay systems, vibration suppression, mechatronic control system design, and control of industrial processes.

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