UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

**DOTTORATO DI RICERCA / PHD PROGRAM IN
INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING**

Seminar announcement

Thursday 21 April 2022, Time: 15:30 - 16:30,

Room AULA SEMINARI, Floor 1, Building 3, DIETI - Via Claudio, 21 – NAPOLI

Thursday 28 April 2022, Time: 15:30 - 16:30

Room TBD, Floor TBD, Building TBD, DIETI - Via Claudio, 21 – NAPOLI

Online on MS Teams (code: **fbg18vn**):

Link:https://teams.microsoft.com/l/team/19%3aPpKSerOyckfmld3qyAVE90keHEyrrdrUipZE1Bw32J01%40thread.tacv2/conversations?groupId=594fd5f5-1d19-4b31-b213-30855ed2c959&tenantId=2fcfe26a-bb62-46b0-b1e3-28f9da0c45fd

Prof. Emilia Fridman

Tel Aviv University, Tel Aviv, Israel,

School of Electrical Engineering Tel Aviv University

Using delays for control

Abstract: "Using delays for control" refers either Time-Delay Approaches to control problems (that originally may be free of delays) or intentional inserting delays to the feedback. These two lectures will start with an old Time-Delay approach to sampled-data control. In application to network-based control with communication constraints, this is the only approach that allows treating transmission delays larger than the sampling intervals. "Using artificial delays" via simple Lyapunov functionals will be presented, that leads to feasible LMIs for small delays and to simple sampled-data implementation. Finally, a new time delay approach to Averaging will be illustrated. The existing results on averaging (that have been developed for about 60 years starting from the works of Bogoliubov and Mitropolsky) are qualitative: the original system is stable for small enough values of the parameter if the averaged system is stable. Conversely, this time-delay approach provides the first quantitative bounds on the small parameter making averaging-based control (including Vibrational Control and Extremum Seeking) reliable.

Lecturer short bio: *Emilia Fridman received the M.Sc. degree from Kuibyshev State University, USSR, in 1981 and the Ph.D. degree from Voronezh State University, USSR, in 1986, all in mathematics. From 1986 to 1992 she was an Assistant and Associate Professor in the Department of Mathematics at Kuibyshev Institute of Railway Engineers, USSR. Since 1993 she has been at Tel Aviv University, where she is currently Professor at the School of Electrical Engineering. She has held numerous visiting positions including INRIA in Rocquencourt (France), Ecole Centrale de Lille (France), Valenciennes University (France), Leicester University (UK), Kent University (UK), CINVESTAV (Mexico), Zhejiang University (China), St. Petersburg IPM (Russia), Melbourne University (Australia), INRIA Saclay (France), KTH (Sweden). Her research interests include time-delay systems, networked control systems, distributed parameter systems, robust control, singular perturbations and nonlinear control. She has published about 200 journal articles. She is the author/co-author of two monographs - ''Introduction to Time-Delay Systems: Analysis and Control" (Birkhauser, 2014) and ''Networked Control under Communication Constraints: A Time-Delay Approach" (Springer, 2020). She serves/served as Associate Editor in Automatica, SIAM Journal on Control and Optimization and IMA Journal of Mathematical Control and Information. In 2014 she was Nominated as a Highly Cited Researcher by Thomson ISI. Since 2018, she has been the incumbent for the Chana and Heinrich Manderman Chair on System Control at Tel Aviv University. She is an IEEE Fellow from 2019. In 2021 she was recipient of the IFAC Delay Systems Life Time Achievement Award and of the Kadar Award for outstanding research at Tel Aviv University. She is currently a member of the IFAC Council.*