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VORTRAGSANKÜNDIGUNG

Im Rahmen unseres gemeinsamen Oberseminars

„Numerische Mathematik, Optimierung und Dynamische Systeme“

spricht

Dr. Andrii Mironchenko,
Department of Mathematics, the University of Klagenfurt

am Freitag, 19.07.2024 um 14:00 Uhr im Raum S 78, Gebäude NW II

über das Thema

"Input-to-state stability meets small-gain theory”

Abstract: In most cases, one shows the stability of a nonlinear system by the construction of a suitable Lyapunov function for it. However, if the system is a complex large-scale or potentially infinite network of nonlinear agents, direct analysis of the stability of such a system becomes very challenging. The problem becomes even more complex, if the number of agents, which are acting in the network is unknown. Nonlinear small-gain theory for finite networks of ODE systems has provided efficient methods to counteract these challenges and has become the basis for the powerful methods of nonlinear controller design. In this talk, we present the full generalization of the Lyapunov-based nonlinear small-gain theorem to the case of countably many interacting systems. We use Lyapunov methods combined with the analysis of nonlinear monotone systems on a positive cone of certain sequence spaces. If the gain operator is homogeneous and subadditive, we prove constructive results giving an explicit expression for the Lyapunov function of the infinite network. Though we focus on infinite ODE networks, we expect that the results can be extended to infinite networks consisting of infinite-dimensional components, and we have developed some machinery for this case as well

gez. Lars Grüne