



Input-to-state stability for infinite-dimensional systems

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The notion of input-to-state stability (ISS) was introduced by E. D. Sontag for non-linear finite-dimensional systems in the late 1980s. ISS unified the Lyapunov and input–output stability theories and influenced the constructive nonlinear control theory for finite-dimensional systems. It has played a major role in the robust stabilization of nonlinear systems, design of robust (in terms of errors in measurements and/or quantization) nonlinear observers, nonlinear detectability, stability of nonlinear large-scale networks, nonlinear sample data and event-triggered control, stability of networked control systems, supervisory adaptive control, and many other areas.

An infinite-dimensional system is a system which can be formulated mathematically as an equation on an infinite-dimensional vector space. In particular, partial differential equations, partial differential algebraic equations, stochastic partial differential equations, delay equations, integro-differential equations and combinations thereof are in this class. Thus, a wide variety of phenomena such as heat transfer, acoustics, electrostatics, electrodynamics, fluid dynamics, population dynamics, elasticity, or quantum mechanics can be formalized in terms of infinite-dimensional systems.

This topical collection presents recent progress in input-to-state stability for infinite-dimensional systems and provides an overview of various techniques employed in

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this field. These encompass methods from nonlinear control, operator and semigroup theory, Lyapunov theory, nonlinear networks, and partial differential equations (PDEs).

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