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Title:

On integral input-to-state stability and equivalent notions for infinite-dimensional systems

Abstract:

Notions like *input-to-state stability* and *integral input-to-state stability* are well-known in finite-dimensional system theory. Recently, there has been growing interest in the study of these concepts for infinite-dimensional systems. The goal of this talk is to contribute towards this development. More precisely, we study the stability between the external input *u* and the state *x* of a linear system governed by the equation

$$\frac{d}{dt}x = Ax(t) + Bu(t), \qquad x(0) = x_0,$$

where A and B are (typically unbounded) operators. Formally, stability notions can be interpreted as the boundedness of the input-to-state mapping

$$U \to X : x(\cdot) \to x(\tau), \qquad \tau > 0,$$

where the topology (the norm) of the function space *U* is determined by the particular stability notion, e.g., classical L^p-admissibility refers to $U = L^p$. We show that *integral input-to-state stability* can indeed be understood in this sense rigorously, drawing a connection to admissibility with respect to *Orlicz spaces*. In particular, we focus on stability with respect to functions in L^∞. Furthermore, we study the relation between the different notions and compare them with *(zero-class)* L^p*-admissibility*.

This is joint work with B. Jacob (Wuppertal), R. Nabiullin (Wuppertal) and J.R. Partington (Leeds).