

1. Record Nr.	UNINA9910483782403321
Autore	Karafyllis Iasson
Titolo	Input-to-State Stability for PDEs // by Iasson Karafyllis, Miroslav Krstic
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2019
ISBN	3-319-91011-6
Edizione	[1st ed. 2019.]
Descrizione fisica	1 online resource (XVI, 287 p. 1 illus. in color.)
Collana	Communications and Control Engineering, , 0178-5354
Disciplina	629.8
Soggetti	Automatic control Differential equations, Partial Electrical engineering System theory Control and Systems Theory Partial Differential Equations Communications Engineering, Networks Systems Theory, Control
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Chapter 1. Preview -- Part I: ISS for First-Order Hyperbolic PDEs -- Chapter 2. Existence/Uniqueness Results for Hyperbolic PDEs -- Chapter 3. ISS in Spatial Lp Norms -- Part II. ISS for Parabolic PDEs -- Chapter 4. Existence/Uniqueness Results for Parabolic PDEs -- Chapter 5. ISS in Spatial L2 and H1 Norms -- Chapter 6. ISS in Spatial Lp Norms -- Part III. Small-Gain Analysis -- Chapter 7. Fading Memory Input-to-State Stability -- Chapter 8. PDE-ODE Loops -- Chapter 9. Hyperbolic PDE-PDE Loops -- Chapter 10. Parabolic PDE-PDE Loops -- Chapter 11. Parabolic-Hyperbolic PDE-PDE Loops -- Reference. .
Sommario/riassunto	This book lays the foundation for the study of input-to-state stability (ISS) of partial differential equations (PDEs) predominantly of two classes—parabolic and hyperbolic. This foundation consists of new PDE-specific tools. In addition to developing ISS theorems, equipped with gain estimates with respect to external disturbances, the authors develop small-gain stability theorems for systems involving PDEs. A variety of system combinations are considered: PDEs (of either class)

with static maps; PDEs (again, of either class) with ODEs; PDEs of the same class (parabolic with parabolic and hyperbolic with hyperbolic); and feedback loops of PDEs of different classes (parabolic with hyperbolic). In addition to stability results (including ISS), the text develops existence and uniqueness theory for all systems that are considered. Many of these results answer for the first time the existence and uniqueness problems for many problems that have dominated the PDE control literature of the last two decades, including—for PDEs that include non-local terms—backstepping control designs which result in non-local boundary conditions. Input-to-State Stability for PDEs will interest applied mathematicians and control specialists researching PDEs either as graduate students or full-time academics. It also contains a large number of applications that are at the core of many scientific disciplines and so will be of importance for researchers in physics, engineering, biology, social systems and others.
