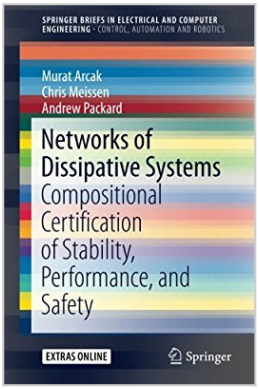

Networks of Dissipative Systems: Compositional Certification of Stability, Performance, and Safety (SpringerBriefs in Electrical and Computer Engineering)

By Murat Arcak, Chris Meissen, Andrew Packard

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This book addresses a major problem for today’s large-scale networked systems: certification of the required stability and performance properties using analytical and computational models. On the basis of illustrative case studies, it demonstrates the applicability of theoretical methods to biological networks, vehicle fleets, and Internet congestion control. Rather than tackle the network as a whole ?an approach that severely limits the ability of existing methods to cope with large numbers of physical components? the book develops a compositional approach that derives network-level guarantees from key structural properties of the components and their interactions. The foundational tool in this approach is the established dissipativity theory, which is reviewed in the first chapter and supplemented with modern computational techniques. The book blends this theory with the authors’ recent research efforts at a level that is accessible to graduate students and practising engineers familiar with only the most basic nonlinear systems concepts. Code associated with the numerical examples can be downloaded at extras.springer.com, allowing readers to reproduce the examples and become acquainted with the relevant software.

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Editorial Review

About the Author

Murat Arcak is a professor at U.C. Berkeley in the Electrical Engineering and Computer Sciences Department. His research is in dynamical systems and control theory with applications to synthetic biology, multi-agent systems, and transportation. He received the Donald P. Eckman Award from the American Automatic Control Council in 2006, the Control and Systems Theory Prize from the Society for Industrial and Applied Mathematics (SIAM) in 2007, and the Antonio Ruberti Young Researcher Prize from the IEEE Control Systems Society in 2014. He is a member of SIAM and a fellow of IEEE.

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