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Process Control introduces an emerging area in process control - control system analysis and design based on the concept of passive systems. Passive systems are a class of processes that dissipate certain types of physical or virtual energy, defined by Lyapunov-like functions. Passivity and associated stability conditions form one of the cornerstones in control theory and have recently begun to be applied in process control. Defined as an input-output property, the concept of passivity implies stability conditions for interconnected systems. Passive systems are minimum phase and thus very easy to control via output feedback, even if they are highly nonlinear and coupled. Therefore, the passivity framework can be used in process input-output controllability analysis as well as control design. Here, the concept of passive systems is also linked to process thermodynamics to provide process engineers with insights into the physical bases of the above results.

In this book, passivity-based developments in the areas of robust process control, decentralized control, fault tolerant control, process controllability analysis and nonlinear process control are addressed systematically for the first time. Written for the industrial, engineering and academic communities, the emphasis is placed on results that enhance insight and intuition. Application issues are illustrated by case studies in all the main chapters. MATLAB® routines for selected examples and a library of functions that implement the system analysis and control design methods developed in Process Control can be downloaded from springer.com. This book presents the reader with both the conceptual framework and practical tools for passivity-based system analysis and control.

Jie Bao holds the position of Senior Lecturer; he has industrial experience in China with the Control and Measurement Division of ZUSTD Corp. He is a reviewer for several journals including: Journal of Process Control, Journal of Membrane Science, IEEE Automatic Control and ASME Journal of Dynamic Systems, Measurement and Control. In the last seven years, he has published 16 papers in archival journals.

Peter Lee is currently the Executive Dean of Engineering, Science and Computing at Curtin University of Technology. Previously he held senior positions at Murdoch University and the University of Queensland. He also worked with ICI Australia for a number of years. He has worked in Process Control for the last 25 years, both in academe and industry. An author of 3 books and over 220 papers, he also has an active consultancy practice in the feasibility, development and application of process control methods. He is also a consultant to the United Nations Industry Development Organisation. He was awarded the Shedden Pacific Medal for Excellence for contributions to Chemical Engineering in 1993, The Institution of Engineers Australia Excellence Award in 1998 for the design of laboratory facilities at Rockingham and the Centenary Medal for services to Australian society in 2003. Peter was educated in Melbourne and has degrees from RMIT (BE) and Monash University (PhD). He is a Fellow of the Institution of Engineers Australia and a Fellow of the Institution of Chemical Engineers, London.

Peter Lee is the editor of the 1993 Springer title: Lee (ed.), Nonlinear Process Control (3-540-19856-3, 1993, 264 pp HC)