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	Sommario/riassunto	This book presents theoretical and practical findings on the state estimation, diagnosis and control of complex systems, especially in the mathematical form of descriptor systems. The research is fully motivated by real-world applications (i.e., Barcelona's water distribution network), which require control systems capable of taking into account their specific features and the limits of operations in the presence of uncertainties stemming from modeling errors and component malfunctions. Accordingly, the book first introduces a complete set-based framework for explicitly describing the effects of uncertainties in the descriptor systems discussed. In turn, this set-based framework is used for state estimation and diagnosis. The book also presents a number of application results on economic model predictive control from actual water distribution networks and smart grids. Moreover, the book introduces a fault-tolerant control strategy based on virtual actuators and sensors for such systems in the descriptor form. .