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Set-membership Estimation, Analysis, and Experimental Design for Biological Systems

By Steffen Borchers

Shaker Verlag Aug 2013, 2013. Taschenbuch. Book Condition: Neu. 211x146x15 mm. Neuware - Studying biological processes by using dynamical models is a key approach in systems biology. To obtain a reliable model or to improve an existing one, system theoretical methods are required which are suited, first and foremost, for nonlinear dynamical systems and uncertain data. In this thesis, we develop set-based methods to address several theoretical and practical issues encountered when modeling biological processes. The proposed methods are based on describing uncertainty of the available data and disturbances by bounded sets, semidefinite programming relaxations, and set-membership estimation techniques to obtain set-valued outer-estimates of the parameters, states, or inputs. Overall, the proposed methods are applicable to polynomial dynamical systems of moderate size, they yield a robust perspective because uncertainties are taken explicitly into account, and they provide guaranteed and conclusive results. 148 pp. Englisch.



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