1. Record Nr. UNISA996418199503316

Autore	Winkelmann Stefanie
Titolo	Stochastic dynamics in computational biology / / Stefanie Winkelmann, Christof SchuÌtte
Pubbl/distr/stampa	Cham, Switzerland : , : Springer, , [2020] Â©2020
ISBN	3-030-62387-4
Edizione	[1st ed. 2020.]
Descrizione fisica	1 online resource (XVIII, 272 p. 55 illus., 46 illus. in color.)
Collana	Frontiers in Applied Dynamical Systems
Disciplina	570.285
Soggetti	Computational biology Systems biology Stochastic processes
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Introduction -- Well-mixed stochastic reaction kinetics -- Population scaling -- Temporal scaling -- Spatial scaling -- Summary and Outlook -- Mathematical background.
Sommario/riassunto	The aim of this book is to provide a well-structured and coherent overview of existing mathematical modeling approaches for biochemical reaction systems, investigating relations between both the conventional models and several types of deterministic-stochastic hybrid model recombinations. Another main objective is to illustrate and compare diverse numerical simulation schemes and their computational effort. Unlike related works, this book presents a broad scope in its applications, from offering a detailed introduction to hybrid approaches for the case of multiple population scales to discussing the setting of time-scale separation resulting from widely varying firing rates of reaction channels. Additionally, it also addresses modeling approaches for non well-mixed reaction-diffusion dynamics, including deterministic and stochastic PDEs and spatiotemporal master equations. Finally, by translating and incorporating complex theory to a level accessible to non-mathematicians, this book effectively bridges the gap between mathematical research in computational biology and its practical use in biological, biochemical, and biomedical systems.