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Autore	Chen Nan
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Nota di contenuto	Stochastic Toolkits -- Introduction to Information Theory -- Basic Stochastic Computational Methods -- Simple Gaussian and Non-Gaussian SDEs -- Data Assimilation -- Optimal Control -- Prediction -- Data-Driven Low-Order Stochastic Models -- Conditional Gaussian Nonlinear Systems -- Parameter Estimation with Uncertainty Quantification -- Combining Stochastic Models with Machine Learning -- Instruction Manual for the MATLAB Codes.
Sommario/riassunto	This second edition is an essential guide to understanding, modeling, and predicting complex dynamical systems using new methods with

stochastic tools. Expanding upon the original book, the author covers a unique combination of qualitative and quantitative modeling skills, novel efficient computational methods, rigorous mathematical theory, as well as physical intuitions and thinking. The author presents mathematical tools for understanding, modeling, and predicting complex dynamical systems using various suitable stochastic tools. The book provides practical examples and motivations when introducing these tools, merging mathematics, statistics, information theory, computational science, and data science. The author emphasizes the balance between computational efficiency and modeling accuracy while equipping readers with the skills to choose and apply stochastic tools to a wide range of disciplines. This second edition includes updated discussion of combining stochastic models with machine learning and addresses several additional topics, including importance sampling, regression, and maximum likelihood estimate. The author also introduces a new chapter on optimal control. In addition, this book: Covers key topics in modeling and prediction, such as extreme events, high-dimensional systems, and multiscale features Discusses applications for various disciplines including math, physics, engineering, neural science, and ocean science Includes MATLAB® codes for the provided examples to help readers better understand and apply the concepts About the Author Nan Chen, Ph.D., is an Associate Professor at the Department of Mathematics, University of Wisconsin-Madison. He is also a faculty affiliate of the Institute for Foundations of Data Science.