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Lectures On BSDEs, Stochastic Control, And Stochastic Differential Games With Financial Applications (SIAM Series On Financial Mathematics)



Synopsis

The goal of this textbook is to introduce students to the stochastic analysis tools that play an increasing role in the probabilistic approach to optimization problems, including stochastic control and stochastic differential games. While optimal control is taught in many graduate programs in applied mathematics and operations research, the author was intrigued by the lack of coverage of the theory of stochastic differential games. This is the first title in SIAM's Financial Mathematics book series and is based on the author's lecture notes. It will be helpful to students who are interested in stochastic differential equations (forward, backward, forward-backward); the probabilistic approach to stochastic control (dynamic programming and the stochastic maximum principle); and mean field games and control of McKean-Vlasov dynamics. The theory is illustrated by applications to models of systemic risk, macroeconomic growth, flocking/schooling, crowd behavior, and predatory trading, among others. Audience: This book is written for young researchers and newcomers to stochastic control and stochastic differential games. Contents: Preface; List of Notation; Part I: Stochastic Calculus; Chapter 1: Stochastic Differential Equations; Chapter 2: Backward Stochastic Differential Equations; Part II: Stochastic Control; Chapter 3: Continuous Time Stochastic Optimization and Control; Chapter 4: Probabilistic Approaches to Stochastic Control; Part III: Stochastic Differential Games; Chapter 5: Stochastic Differential Games; Chapter 6: Mean Field Games; Bibliography; Author Index; Subject Index

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