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Nota di contenuto	Preface -- Part A. Charge and Spin Transport in Low-Dimensional Structures: Nonlinear Quantum Mechanics: Björn Birnir -- Chaotic Current Self-Oscillations in Doped, Weakly Coupled Semiconductor Superlattices for True Random Number Generation: Yaohui Zhang et al -- Transport out of Locally Broken Detailed Balance: Rafael Sánchez -- Non-Perturbative Approaches in Nanoscience and Corrections to Finite-Size Scaling: J. Kaupuzs et a -- Continuum Model for Coupled Acousto-Optical Phonons in Piezoelectric Materials: Morten Willatzen et al -- Part B. Modeling Biological Phenomena from Nano to Macro Scales: Stochastic Models of Tumor Induced Angiogenesis: L.L. Bonilla et al -- Biofilm Mechanics and Patterns: A. Carpio et al -- Modelling the Unfolding Pathway of Biomolecules: Theoretical Approach and Experimental Prospect: Carlos A. Plata et al -- The Geometry of Most

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Sommario/riassunto

This volume gathers selected contributions from the participants of the Banff International Research Station (BIRS) workshop Coupled Mathematical Models for Physical and Biological Nanoscale Systems and their Applications, who explore various aspects of the analysis, modeling and applications of nanoscale systems, with a particular focus on low dimensional nanostructures and coupled mathematical models for their description. Due to the vastness, novelty and complexity of the interfaces between mathematical modeling and nanoscience and nanotechnology, many important areas in these disciplines remain largely unexplored. In their efforts to move forward, multidisciplinary research communities have come to a clear understanding that, along with experimental techniques, mathematical modeling and analysis have become crucial to the study, development and application of systems at the nanoscale. The conference, held at BIRS in autumn 2016, brought together experts from three different communities working in fields where coupled mathematical models for nanoscale and biosystems are especially relevant: mathematicians, physicists (both theorists and experimentalists), and computational scientists, including those dealing with biological nanostructures. Its objectives: summarize the state-of-the-art; identify and prioritize critical problems of major importance that require solutions; analyze existing methodologies; and explore promising approaches to addressing the challenges identified. The contributions offer up-to-date introductions to a range of topics in nano and biosystems, identify important challenges, assess current methodologies and explore promising approaches. As such, this book will benefit researchers in applied mathematics, as well as physicists and biologists interested in coupled mathematical models and their analysis for physical and biological nanoscale systems that concern applications in biotechnology and medicine, quantum information processing and optoelectronics.