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Nota di contenuto	Constructive Method of Decomposition in Singularly Perturbed Problems of Non-Holonomic Mechanics -- Analysis of Temporal Dissipative Solitons in a Delayed Model of a Ring Semiconductor Laser -- Multi-Scale Problem for a Model of Viral Evolution with Random Mutations -- A Discrete Variant Space Model of Cancer Evolution -- Mathematical Modelling of HIV Within-Host Evolution -- Optimal Control for Anti-Cancer Therapy -- The Two-Scale Periodic Unfolding Technique -- Limit Cycles for Piecewise Linear Differential Systems via Poincaré-Miranda Theorem -- Resonance: the Effect of Nonlinearity, Geometry and Frequency Dispersion -- On the Null-Controllability of

the Heat Equation with Hysteresis in Phase Transition Modeling -- Evidence of Critical Transitions and Coexistence of Alternative States in Nature: The Case of Malaria Transmission -- A Mathematical Model of Cancer Evolution -- Resonance of Isochronous Oscillators -- Modeling of N-Methyl-D-Aspartate Receptors -- Some Lessons from Two Simple Approaches to Model the Impact of Harvest Timing on Seasonal Populations -- Global Stability Conditions of the Disease Free Equilibrium for a Lymphatic Filariasis Model -- Repulsive Invariant Manifolds and Modelling the Critical Phenomena -- A New Approach to Canards Chase in 3D -- Slow Invariant Manifolds in the Problem of Order Reduction of Singularly Perturbed Systems -- Breathing as a Periodic Gas Exchange in a Deformable Porous Medium -- Invariant Objects on Lattice Systems with Decaying Interactions -- Wave-Pinning by Global Feedback in the Bistable Schlögl Model -- Cooperativity in Neurones-Astrocytes Coupled Dynamics -- Resonance-Based Mechanisms of Generation of Relaxation Oscillations in Networks of Non-Oscillatory Neurons -- New Advances on the Lyapunov Constants of Some Families of Planar Differential Systems -- Canards Existence in the Hindmarsh-Rose Model -- Effect of Delayed Harvesting on the Stability of Single-Species Populations -- Gevrey Asymptotics of Slow Manifolds in Singularly Perturbed Delay Equations -- 4-Dimensional Canards and Their Center Manifold -- Modified Model for Proportional Loading and Unloading of Hypoplastic Materials -- Modeling of Excitatory Amino Acid Transporters -- Limitations in Computational Analysis of Retrovirus Evolution -- A Non-Local Formulation of the One-Phase Stefan Problem Based on Extended Irreversible Thermodynamics -- Experimental Investigation of Viscoelastic Hysteresis in a Flex Sensor -- How Does the Hopf Bifurcation Appear in the Hydrogen Atom in a Circularly Polarized (CP) Microwave Field? -- Stabilization of Unstable Periodic Solutions for Inverted Pendulum under Hysteretic Control: the Magnitskii Approach -- Non-Ideal Relay with Random Parameters -- Critical Phenomena in a Dynamical System under Random Perturbations -- Burgers-Type Equations with Nonlinear Amplification: Front Motion and Blow-up -- On Uncertainty Quantification for Models Involving Hysteresis Operators -- Unusual Elastic-Plastic Properties of Fullerene Films: Dynamical Hysteretic Model -- Depinning of Travelling Waves in Ergodic Media -- Cancer Evolution: the Appearance and Fixation of Cancer Cells -- Cheap Control Problem in a Critical Case.

Sommario/riassunto

This volume contains extended abstracts outlining selected presentations delivered by participants of the joint international multidisciplinary workshop MURPHYS-HSFS-2018 (MUltiRate Processes and HYSteresis; Hysteresis and Slow-Fast Systems), dedicated to the mathematical theory and applications of the multiple scale systems, the systems with hysteresis and general trends in the dynamical systems theory. The workshop was jointly organized by the Centre de Recerca Matemàtica (CRM), Barcelona, and the Collaborative Research Center 910, Berlin, and held at the Centre de Recerca Matemàtica in Bellaterra, Barcelona, from May 28th to June 1st, 2018. This was the ninth workshop continuing a series of biennial meetings started in Ireland in 2002, and the second workshop of this series held at the CRM. Earlier editions of the workshops in this series were held in Cork, Pechs, Suceava, Lutherstadt and Berlin. The collection includes brief research articles reporting new results, descriptions of preliminary work, open problems, and the outcome of work in groups initiated during the workshop. Topics include analysis of hysteresis phenomena, multiple scale systems, self-organizing nonlinear systems, singular perturbations and critical phenomena, as well as applications of the

hysteresis and the theory of singularly perturbed systems to fluid dynamics, chemical kinetics, cancer modeling, population modeling, mathematical economics, and control. The book is intended for established researchers, as well as for PhD and postdoctoral students who want to learn more about the latest advances in these highly active research areas.
