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	Nota di contenuto	General introduction -- Honouring marc feix -- Interaction of a ultra-high-intensity electromagnetic pulse with an overdense plasma -- Plasma accelerator simulations using semi-lagrangian 1D and 2D Vlasov code -- 2D vlasov-eulerian simulations: Extension to the relativistic case -- A limiting case of averaging compactness lemmas motivated by the kinetic formulation of some classical systems of fluid mechanics -- Expansion of a negative ion plasma into vacuum -- A presentation of the diffusion velocity method -- Finite-difference

schemes for the diffusion equation -- 1, 2, 3 plasmas! -- The notion of integrability for time-dependent Hamiltonian systems: Illustration from the relativistic motion of a charged particle in an electromagnetic field -- Stochastisation of phases in four-wave interaction -- Light bullets propagation in saturating nonlinear optical medium -- The dynamics of some quantum open systems with short-range nonlinearities -- Global dynamics of fusion plasmas -- The Jeans' criterion and the gravitational instability -- Recent progress in studies of one-dimensional gravitating systems -- Fluctuations of the kinetic energy and stability of coherent structures in a one-dimensional gravitating gas: Numerical simulation -- Structure formation in the one-dimensional gravitational gas -- Interaction forces and space symmetry -- Cellular automaton explosion models -- Acoustic earth imaging by seismic migration -- Integrability and alegbraic solutions for the 2-D lotka-Volterra system -- Isochronous centers of cubic reversible systems -- On the polynomial first integrals of the (a, b, c) Lotka-Volterra system -- Local integrability for nilpotent critical point -- Lie symmetries of generalized Ermakov systems -- Hamilton's principal function and integration by quadratures for an N-degree-of-freedom non - autonomous system given N invertible invariants in involution -- Hierarchies of similarity symmetries and singularity analysis -- Area preserving flows on compact connected surfaces -- A lattice model for tropical rain forests -- Periodic solutions and associated limit cycle for the generalised Chazy equation -- A branch and bound algorithm for the flow-shop scheduling problem -- On the linear third-order differential equation -- Telecommunication network optimisation and statistical physics -- A study of the analytical and local semiclassical Wigner distribution -- Quantum transition and irreversibility -- Pioneering in plasma simulation.

Sommario/riassunto	Published in honour of Marc Feix this book tries to give a thorough overview of mathematical methods, analytical and numerical techniques and simulations applied to a variety of problems from physics and engineering. The book addresses graduate students, researchers and especially engineers. The main emphasis is to apply the generality of methods to form a coherent and stimulating approach to practical investigations.