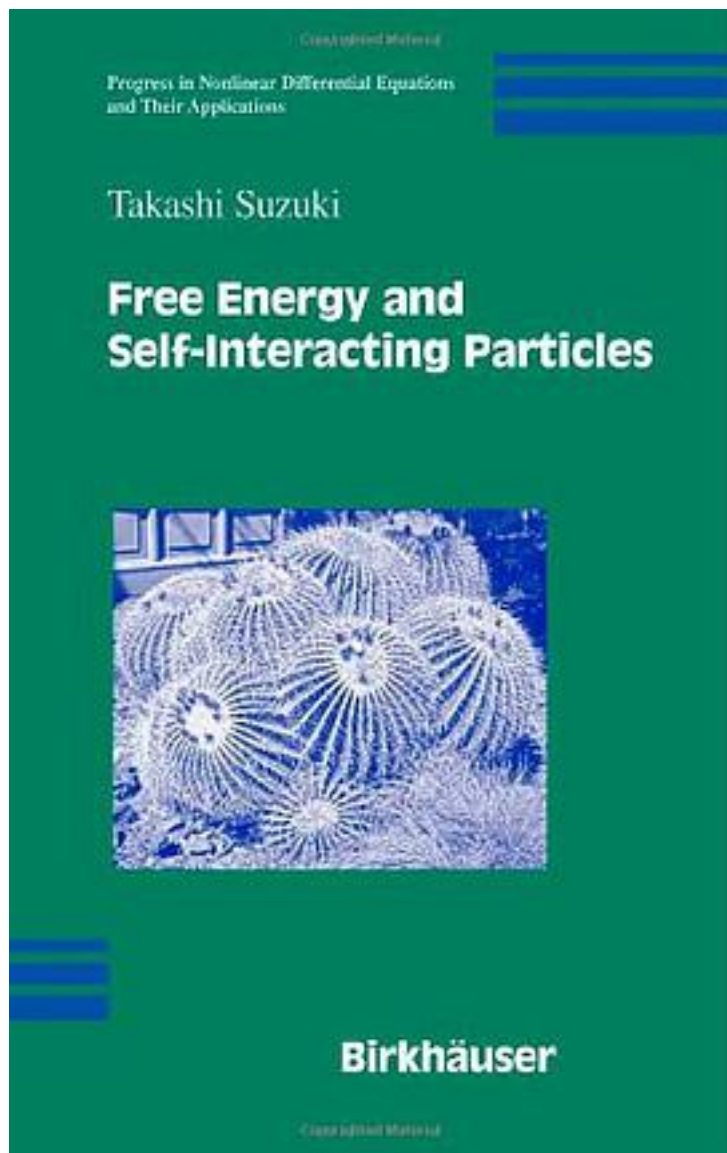


# Free Energy and Self-interacting Particles



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This book examines a nonlinear system of parabolic partial differential equations (PDEs) arising in mathematical biology and statistical mechanics. In the context of biology, the system typically describes the chemotactic feature of cellular slime molds. One way of deriving these equations is via the random motion of a particle in a cellular automaton. In statistical mechanics the system is associated with the motion of the mean field of self-interacting particles under gravitational force. Physically, such a system is related to Langevin, Fokker-Planck, Liouville and gradient flow equations. Mathematically, the mechanism can be referred to as a quantized blowup. This book describes the whole picture, i.e., the mathematical and physical principles: derivation of a series of equations, biological modeling based on biased random walks, the study of equilibrium states via the variational structure derived from the free energy, and the quantized blowup mechanism based on several PDE techniques.

作者介绍:

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