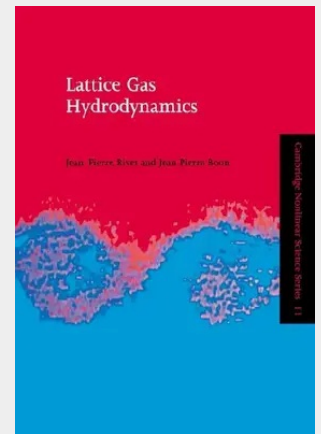


Lattice Gas Hydrodynamics

Lattice Gas Hydrodynamics describes the approach to fluid dynamics using a micro-world constructed as an automaton universe, where the microscopic dynamics is based not on a description of interacting particles, but on the laws of symmetry and invariance of macroscopic physics. We imagine point-like particles residing on a regular lattice, where they move from node to node and undergo collisions when their trajectories meet. If the collisions occur according to some simple logical rules, and if the lattice has the proper symmetry, then the automaton shows global behavior very similar to that of real fluids. This book carries two important messages. First, it shows how an automaton universe with simple microscopic dynamics - the lattice gas - can exhibit macroscopic behavior in accordance with the phenomenological laws of classical physics. Second, it demonstrates that lattice gases have spontaneous microscopic fluctuations which capture the essentials of actual fluctuations in real fluids.

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