A Journey from Cellular Automata and Kinetic Theory to Lattice Boltzmann Models

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Lattice Boltzmann Models (LBM) are often perceived as lacking strong mathematical support. This presentation will review the history of LBM from cellular automata and kinetic theory through Lattice Gas Automata (LGA) in an attempt to sort out misunderstandings due to some loss of information in the transition from LGA to LBM from real mathematical problems.

In a first part the theoretical foundations of LGA will be recalled with a special emphasis on the fact that they are based on underlying LBM. In a second part, the evolution from the LBM derived from the LGA toward those used nowadays will be outlined. The presentation will be concluded with my list of unsolved mathematical difficulties and misunderstandings often found in the LBM literature.