

Cellular automata constitutes original computational methods, that found its application in many disciplines.

The special class of cellular automata, so called lattice gas automata were succesfull in dealing with many challenges in hydrodynamic simulations, and they bootstrap one of the most perspective CFD methods, the Lattice Boltzmann models.

In the theoretical part, we follow the evolution of the lattice gas automata, explore the theory behind them, and from their microdynamics, we derive the macroscopic equations.

In the practical part, we implemented two distinct types of LGCA, the pair-interaction automata and FCHC.

We applied them on the flow around obstacles of various shapes.

The scientifically most relevant part concerns statistical properties of the turbulent flow simulated by LGCA, but requires further research to conclude it.