

## Lattice Boltzmann methods for heat and mass transfer

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## PROPOSAL

The lattice Boltzmann method is a highly innovative approach to fluid dynamics, which is based on the solution of a minimal Boltzmann kinetic equation, rather than on the discretization of the Navier-Stokes equations of continuum mechanics.

This minimal Boltzmann equation, known as Lattice Boltzmann equation (LBe), was developed in the late 80's and early 90's, in response to the major drawbacks of its ancestor, the Lattice Gas Cellular Automata method. Ever since, LBE research has known a burgeoning growth, which has led to an extremely elegant and computationally efficient approach to the most complex problems in fluid dynamics.

These range from low-Reynolds single and multiphase flows in highly heterogeneous (porous) media, all the way to fully turbulent flows in complex geometries of direct industrial relevance, such as real-life cars and airplanes.

In hindsight, the most fundamental asset of LBe rests with its mesoscopic nature, lying in between the kinetic and continuum descriptions of fluid flows. This may allow LBe to combine some advantages of the two approaches: the geometrical flexibility of kinetic methods with the large-scale resolution of continuum methods.

The objective of this minisymposium is to present the most recent theoretical advances and applications of the lattice Boltzmann method for heat and mass transfer.

## REFERENCES

- [1] Succi, S., *The Lattice Boltzmann Equation for Fluid Dynamics and Beyond*. 2001. Oxford University Press, Oxford.