Mechanics & Industry **17**, 201 (2016)

DOI: 10.1051/meca/2015072
www.mechanics-industry.org

Mechanics & Industry

Editorial

The DSFD series of conferences began with the historic 1986 Los Alamos conference organized by Gary D. Doolen. Since that time, the DSFD conferences have emerged as the leading forum for researchers in the field, and many exciting new discoveries in lattice models of fluid dynamics have been first announced there. Topics emphasized at these meetings include lattice Boltzmann schemes, dissipative particle dynamics, smoothed-particle hydrodynamics, direct simulation Monte Carlo, molecular dynamics, etc.

Given the various physical areas covered by numerical methods exposed during DSFD conferences, one of the objectives of the 2014 edition, which took place at the Ecole Normale Supérieure in Paris from 28 July to 1 August 2014, was to promote a multi-disciplinary approach by hosting conferences and lectures on highly theoretical subjects, such as those aimed at justifying the Boltzmann lattice algorithms, as well as on very applied topics and even industrial ones. At the fundamental level, we will retain the lattice Boltzmann models of high order, multi-speed models, boundary conditions, etc. Among the numerous applications which may be specified, we will mention the optimization of the aerodynamic shape of a car, the problems of multiphase flow for the oil industry, colloidal suspensions, simulation of micro-fluidic devices, etc.

This issue brings together three contributions with varied applications to the industrial sector, selected and proposed by the Local Organizing Committee of DSFD 2014. Each contribution has led to a review process approved by the journal of Mechanics and Industry. In these papers are numerical simulations performed using conventional lattice Boltzmann methods, newer methods such as lattice Boltzmann using multiple relaxation time (TRT LB), and also classical methods.

Among the themes, one concerns standstone media. It is an interesting investigation of two phase flow in several three-dimensional porous rock samples. A 3D lattice Boltzmann based on pore scale simulation is used. Second, two-dimensional simulations using a version of two-population lattice Boltzmann are made on the heat transfer in a gas phase, along with the temperature diffusion inside solid particles. Simulations are compared with experimentation on thermal storage. Finally, a new piezoelectric micropump based on Coanda effect is investigated and fabricated. With no moving valves, it has a great advantage for transporting fluid containing cells or particles. Performance of the micropump is studied by numerical simulation, and compared with experimental results.

Of course, these three papers do not constitute a large treatment of the topics where the lattice Boltzmann methods give results, but they constitute some examples for researchers in this aerea. Let us add that these simulation methods, because of their ease of implementation and adaptation to numerous physical problems, have huge potential from the point of view of basic research as well as for industrial applications.

Stéphane Dellacherie
CEA, centre de Saclay, France and *École Polytechnique de Montréal, Canada*

François Dubois
CNAM Paris and *Université Paris-Sud, France*

Stephan Fauve
École Normale Supérieure, Paris, France

Renée Gatignol
Université Pierre et Marie Curie, Paris, France