The 24^{th} International Conference on Discrete Simulation of Fluid Dynamics in Edinburgh, Scotland

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The Discrete Simulation of Fluid Dynamics (DSFD) series of conferences originated with the 1986 Los Alamos conference organised by Gary D. Doolen. Since that time, the DSFD conferences have emerged as the premier forum for researchers in the field, and many exciting new discoveries in lattice models of fluid dynamics have been announced at DSFD conferences. Topics emphasised at these meetings include lattice Boltzmann schemes, dissipative particle dynamics, smoothed-particle hydrodynamics, direct simulation Monte Carlo, molecular dynamics, quantum Monte Carlo methods, multiparticle collision dynamics and hybrid methods. At the 23rd edition of DSFD in Paris 2014, we were given the privilege of organising the 24th running of the meeting series in Edinburgh, from 13th to 17th July 2015 at the Royal Society of Edinburgh, which names Adam Smith, Joseph Black and Benjamin Franklin among its founding fellows. Edinburgh is Scotland's truly cosmopolitan capital. Apart from its amazing castle and Arthur's Seat (an ancient volcanic plug), parts of the city centre are UNESCO World Heritage Sites. Numerous famous scientists have been born or worked in Edinburgh, for example Alexander Graham Bell, Max Born, Charles Darwin, Peter Higgs or James Clerk Maxwell. We were delighted to host a total of 164 attendees, 60 of whom were students, from 21 countries. We enjoyed twelve invited talks and 100 contributed talks. There were 29 posters and 16 flash presentations. We had, of course, a great deal of help in preparing the meeting, particularly from The University of Edinburgh, our colleagues on the Scientific Committee, the conference venue the Royal Society of Edinburgh, and this Journal for the publication of this Special Issue. We are also grateful to the following for their financial support, without which arranging the meeting would have been impossible: Porous Media, Processes and Mathematics; SoftComp; the British Heart Foundation; Sphere Fluidics; Electric Ant Lab; The American Physical Society; UK-COMES, the UK Consortium on Mesoscale Engineering Sciences; SUPA, the Scottish

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We are very pleased that with this Special Issue the Journal of Computational Science has given us the opportunity to present the latest developments in theory and application of discrete simulation methods for fluid dynamics. Topics discussed at the conference include the theory of lattice Boltzmann, e.g. the mathematical lattice structure [14], mixed quadratures for finite Knudsen number flows [1], optimisation of pseudopotential models [6], phase-field models for multiphase flows [18] and axisymmetric multiphase models [13]. Other presenters focussed on various lattice Boltzmann applications, such as the simulation of harbour seal vibrissae [10], diffusivity and reactivity of nanoporous catalyst media [9], rare cell capture in obstacle arrays [3] and the PowerFLOW solver for multicomponent engineering applications [12]. A specific emphasis was put on droplet dynamics through various simulation methods, including droplet dynamics in confinement [4], bounce regime of droplet collisions [19], contact angle hysteresis of microdroplets on structured surfaces [2] and phase-field simulations of partially wetted and textured surfaces [16]. One of the conference topics was multiscale problems in fluid dynamics, for instance the coupling for lattice Boltzmann and conventional Navier-Stokes solvers [11], a hybrid molecular-dynamics/fluctuating-hydrodynamics model [5] and direct-simulation-Monte-Carlo/lattice-Boltzmann mapping for gas flows [15]. Finally, the conference featured a number of multi-physics applications, including inertial dilute particle flow with an Euler-Euler lattice Boltzmann method [17], lattice Boltzmann for light simulation and radiative transport through absorbing and scattering media [8] and jet electro-hydrodynamics [7].

We hope these contributions will be of interest and value to readers from a wide range of subject areas and form a reference for future development of discrete simulation methods of fluid dynamics.

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