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The spheric community

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THE SPHERIC COMMUNITY

BY DAMIEN VIOLEAU AND BEN D. ROGERS

The Smoothed Particle Hydrodynamics (SPH) numerical method is nowadays becoming a classical tool in academic research and in recent years has produced numerous successful industrial applications in fluid dynamics and fluid-structure interactions. As a purely Lagrangian technique, SPH enables the simulation of highly distorting fluids and solids. Fields including free-surface flows, solid mechanics, multi-phase, fluid-structure interaction and its original field of development, astrophysics, where Eulerian methods can be difficult to apply represent ideal applications of this meshless method.

Publications in peer-reviewed journals show that an increasing number of academic institutes or industrial companies contribute to this development all around the world, particularly in Europe. Collaborations between labs of various countries are also becoming increasingly numerous, meaning that SPH is approaching maturity in applied and industrial sciences.

SPHERIC, or "SPH European Research Interest Community", is an international community which aims to promote the SPH method in both academic and industrial fields and enhance collaborations between countries and institutes. It was recognized as a Special Interest Group (SIG) within Ercoftac (European Research Community on Flow, Turbulence and Combustion) in January 2006. Today, SPHERIC has more than 60 member institutes, including several industrial partners. Currently, 28 countries are represented. A Steering Committee of 13 individuals from academia and industry meets twice a year for a 1-day meeting to take decisions regarding the group activities.

The Paris SPHERIC workshop (June 2014)

SPHERIC's website (https://wiki.manchester.ac.uk/spheric) depicts the activities of the group. The main event is the annual workshop, a 3-day small conference where about 100 delegates meet to share their recent improvements. High quality proceedings are provided for the participants, and a training day allows newcomers to get more familiar with SPH. The best student presentation is awarded the Libersky prize.

Benchmark test cases are also available on the website, as well as job proposals, a large list of reference papers in Bibtex format, useful links, etc. A biannual newsletter is published and sent all around the world with each issue containing 8 to 10 pages submitted by SPHERIC members detailing significant innovations and applications of SPH in various fields. The past issues can be downloaded from the website.

Though being a mature approach, SPH still suffers from a lack of broad recognition from the scientific community as a serious candidate to become one of tomorrow's numerical tools. One of the main reason of this is that SPH still has unknown characteristics, and many questions remain unanswered on purely theoretical grounds. In order to progress in the knowledge of these problems, SPHERIC has identified four Grand Challenges: Convergence, Numerical stability, Boundary conditions and Adaptivity. Named after one the original developers of SPH, the Joe Monaghan Prize has been established to recognise SPH researchers who make outstanding advances in one or more SPHERIC Grand Challenges.

Newcomers in SPH are encouraged to visit our website and attend our workshops. We hope this special issue of Hydrolink will enhance the interest in this challenging and fascinating numerical method.

Damien Violeau **has been working since 1997 at the Laboratoire National d'Hydraulique et Environnement of EDF R&D, where he was appointed Senior Scientist in 2013. He was introduced to IAHR in 2003. He was co-opted member of the Council in 2013 and was appointed Associate Editor if the JHR in January 2015.**

Benedict Rogers **is a Reader at the School of Mechanical, Aerospace and Civil Engineering (MACE) in the University of Manchester. With his doctoral studies in numerical simulation of free-surface flow for shallow water, he has more than 13 years of experience of SPH research having published over 30 journal papers on SPH.**