

Fully-funded PhD Studentship in multi-phase flow simulation

Development of a Smoothed Particle Hydrodynamics (SPH) model to simulate transitions of gas-liquid two-phase flow regimes

Eligibility: UK candidates will receive the full stipend
Start date: April 2019 or as soon as possible thereafter
Funding: Fees (£4,299) and stipend £14,777 +£1,000 topup
Sponsor: Électricité de France (EDF) R&D and University of Manchester
Closing date for applications: as soon as possible in 2019

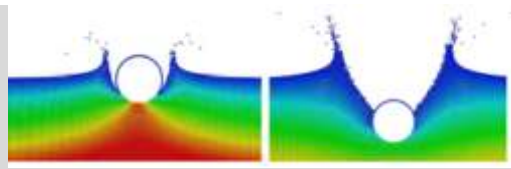
Project details:

Many applications exist where it is crucial to predict the two-phase flow regimes as well as transitions between them. Examples include a “separated” to a “dispersed” regime where one phase is present as a set of individual elements such as bubbles or droplets. However, few simulation methods can capture the full physics. This PhD will use Smoothed Particle Hydrodynamics (SPH). SPH has no computational mesh and is revolutionising engineering simulation being ideal for potentially violent free-surface hydrodynamics where there is strong nonlinearity with highly complex moving geometries. The aim is to develop a fine-grained numerical model for gas-liquid two-phase flows, based on a fluid-mechanical to capture transitions between flow regimes and predict flow characteristics for given external conditions.

SPH simulation snapshots



Multi-phase sloshing



Cylinder-surface impact

The research developed here will be applicable to various fields including scour around hydraulic structures and the heat-generating flows in the nuclear industry. We will address the important issues of identifying the best techniques for modelling complex mixtures in the context of predicting the resultant hydrodynamics, identify effects of different mechanisms, and apply to test cases involving data and cases relevant to EDF.

This fully-funded PhD studentship is part of an Électricité de France (EDF) project in the exciting new area modelling of the multi-phase thermal nuclear flows and civil engineering hydraulics using Smoothed Particle Hydrodynamics (SPH). The PhD student will become a member of our highly successful SPH research group at the University of Manchester SPH@Manchester. The PhD Studentship is available immediately.

Qualifications applicants should have/expected to receive:

The successful candidate should have a good first degree in a suitable Engineering discipline such as mechanical or civil engineering, including a sound knowledge of mathematics. Experience (or a keen interest) in computer programming would be a definite advantage, for example C++/CUDA.

Contact for further information:

See the SPH@Manchester website for information about our SPH research group

Informal enquiries regarding the project should be directed to Prof. B D Rogers: (email: benedict.rogers@manchester.ac.uk or by telephone +44(0) 161 306 2615).