MANCHESTER 1824
The University of Manchester

Faculty of Sciences and Engineering
School of Mechanical, Aerospace & Civil Engineering

Fully-funded PhD Studentship in motorsport flow simulation

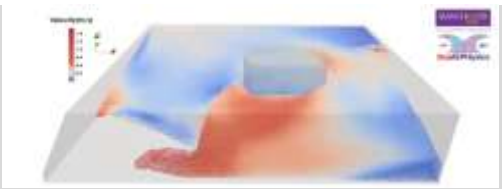
"Development of efficient Smoothed Particle Hydrodynamics (SPH) for contained flows in motorsport applications"

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
Sponsor: Motorsport Company and University of Manchester
Closing date for applications: as soon as possible in 2019

Project details:
The design and performance of motorsport vehicles relies on key components including the gear box and fuel tank. Achieving optimum power transfer and maintaining engine fuel supply is a very challenging task where the flows occur in extremely complex geometries under rapidly-varying imposed forces and involve gear wheels rotating at many 1000s revolutions per minute generating heat. The accelerations during certain conditions, can be up to five times gravity, are beyond experimental rigs, making computer simulation the only design option. Conventional computational fluid dynamics (CFD) is not well suited to simulate the violent hydrodynamics occurring in the engine such as in the gear box due to the complex and generally highly distorted, surface motion. 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 an efficient SPH model using new ideas for variable resolution with particle splitting & merging. The simulations will be accelerated on graphics processing units (GPUs) as part of our open-source DualSPHysics code.

SPH simulation snapshots

Multi-phase sloshing



Fuel-tank sloshing

This fully-funded PhD studentship is part of an industrial project in the exciting new area modelling of the multi-phase flows 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).