



## Meeting 3 Report – The Centre for Modelling and Simulation, Bristol

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The third UK Fluids Network Smoothed Particle Hydrodynamics (SPH) Special Interest Group (SIG) was hosted by the University of Bristol's faculty of engineering in third-party Centre for Modelling and Simulation (CFMS) building at the Bristol and Bath Science Park on the 18<sup>th</sup> of December 2018.



*SPH SIG Members in front of a Christmas Tree at the CFMS building, Bristol*

The following SIG members were present at the meeting (by organisation):

**STFC:** Stephen Longshaw (SL)

**The University of Manchester:** Benedict Rogers (BR); Georgina Reece (GR); Georgios Fourtakas (GF); Aaron English (AE)

**The University of Bristol:** Thomas Rendall (TR); James Kratz (JK); Samantha Huntley (SH)

**The University of Durham:** Richard Bower (RB)

**The University of Exeter:** Matthew Bate (MB); Pablo Loren-Aguilar (PLA)

**The University of Plymouth:** Ruaa Wana (RW); Hassan Sdiq (HS)

**The University of Sheffield:** Karl Travis (KT); Matthew Horton (MH)

**The University of Edinburgh:** Konstantinos Georgoulas (KG)  
**The University of Bournemouth:** Robert Kosk (RK); Richard Southern (RS)  
**Airbus UK:** Francesco Gambioli (FG)  
**CFMS:** Andrei Cimpoeru (AC)

The meeting saw an agenda that included eight technical presentations given around potential application areas for SPH as well as astrophysics and computer graphics applications. It was preceded by a brief introduction to the SIG by Stephen Longshaw as well as the SIGs two upcoming meetings in 2019. An overview of the presentations given can be found in section 1.0 and an overview of the next two meetings in section 2.0.

## 1.0 Technical Presentations

### Theme 1: Manufacturing and Industrial

Samantha Huntley: *Composites Recycling*  
James Kratz: *Flow Problems in Composites Manufacturing*  
Francesco Gambioli: *Fuel Sloshing*  
Karl Travis: *Ball-plate Penetration*

### Theme 2: Astrophysics & Computer Graphics

Richard Bower: *Simulating the Universe with SWIFT*  
Pablo Loren-Aguilar: *Dust and Gas Mixtures in Planet Formation Scenarios*  
Matthew Bate: *SPH for Studying Star & Planet Formation*  
Richard Southern: *On the use of Particle-in-Cell Methods in Visual Effects*



*Dr Karl Travis from The University of Sheffield presenting work on using SPH for studying ball-plate penetration as part of a multi-scale framework*



*Professor Richard Bower from Durham University talking about simulating the universe using SPH*

## 2.0 SIG Future

The goal of this SIG meeting was to explore areas of science and industry that use the SPH outside of typical applications. Talks centred around application of the method to its original purpose, astrophysics, as well as explorations of its application to various manufacturing problems. There was also insight into where SPH fits into the world of computer graphics and, more specifically, why its uptake is currently overshadowed by other methods.

Prior to the SIG a brief discussion was held as to its future, currently there are two more vents planned in 2019, the first to engage with UK industry at an application level and the second the final event before the UKFN SIGs are drawn to a close in September.

The first event will be held in the first half of 2019, approximately in April/May while the final event will be towards the end of September.

Suggestions for locations to host the next meeting were offered and will be explored in the coming weeks following this report, of importance I a location that UK industry will be encouraged to attend. The format of the meeting has yet to be finalised but the general goals are to open a dialog between UK industry (both those currently aware of SPH and those unaware) and the SPH SIG around the method, its capabilities and what practical software solutions currently exist to enable its use in real-world work-flows.

The second meeting is intended as a two day event, location to be determined, with the goal of bringing as many of the SIG to the same place at the same time as well as providing a training workshop aimed at early career researchers/PhD students or industrial users interested in learning about the method practically.