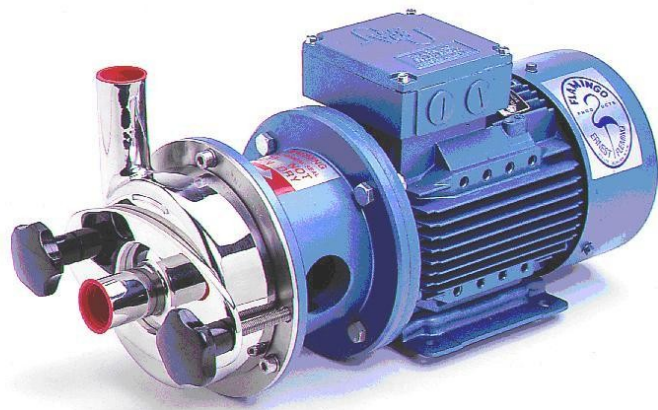


**BlueBEAR** provides a substantial computing resource that properly supports the research work of research staff and students at Birmingham. It provides a cost effective facility that optimises the effectiveness of research and ensures the University continues to be a world-class academic learning and research environment.

## Modelling Multiphase Flow and Emulsification in a "Sonolator" inline static mixer



### Challenges

To understand the mechanisms by which emulsions are formed in a Sonolator, a commercially available inline static mixer.

### Background

Many devices which produce emulsions, such as a "Silverson" rotor-stator mixer or a stirred vessel, have been already investigated in detail in the literature. However the Sonolator's mode of action is currently unknown.

The Sonolator is shaped like a hollow tube about 10cm long and 2.5cm in diameter. There is a nozzle inside it which forces liquid through a narrow gap approximately 1x4mm in size. This subjects the liquid to a considerable drop in pressure, which contributes to creating emulsion droplets of oil in water. The mechanism is unknown; turbulent shear forces, cavitation or other forces could contribute.

### Results

Research will focus on computational fluid dynamical (CFD) simulations of the fluid region within the Sonolator using the ANSYS ICEM meshing tool and the ANSYS CFX simulation tool, particle image velocimetry experiments to validate the CFD simulations, industrial research on a Sonolator in use at a pilot plant. The BEAR cluster will be used to carry out large scale CFD simulations requiring millions of cells and calculations to converge and resolve the flow fields. The output will be velocity fields which can be used to estimate what shear forces individual oil droplets will undergo when travelling through the Sonolator, and hence the droplet size distribution which results.



### Client Profile

David Ryan  
Chemical Engineering  
The University of Birmingham  
Birmingham  
B15 2TT

### Contact Details

djr903@bham.ac.uk

### Product Used

Ansys CFX  
Sonolator (Sonic Corp)

### Funding

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### Contributors

Dr Mark Simmons  
University of Birmingham  
Dr Mike Baker  
Unilever Research &  
Development, Port Sunlight

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BIRMINGHAM**

### For more information:

BEAR, IT Services  
Elms Road Computer Centre (G5)  
Edgbaston  
Birmingham B15 2TT  
Tel: 0121 414 5877  
Email: [bearinfo@contacts.bham.ac.uk](mailto:bearinfo@contacts.bham.ac.uk)  
Website: [www.bear.bham.ac.uk](http://www.bear.bham.ac.uk)