SPECIAL ISSUE “Micro and Nano Flows 2014 (MNF2014) – Biomedical Stream”

EDITORIAL

This special issue is dedicated to Professor Michael W. Collins who sadly passed away during the organisation of this conference. It is a tribute to his instrumental role in establishing this conference series, identifying special session topics of interest and to his overall contribution to the fields of biomedical and thermal engineering.

The 2014 Conference on Micro and Nano Flows, MNF2014, was held at University College London, 7-10 September, which was the fourth, successful conference in the series. These conferences provide a forum for scientists and engineers working in the area of small scale flows to present results of their recent research and to discuss issues that need to be addressed in order to advance understanding and application of these flows within the broader areas of biofluid mechanics and thermofluids engineering.

As with the previous meetings the conference was organised in three parallel sessions, namely single phase flows, two phase flows and biomedical flows with a number of special sessions dedicated to specialist subjects such as “Mathematical modelling of multiphase microflows: From particles to interfaces”, “Biomedical microfluidics of lab-on-a-chip technology”, and “New Ultrafine Optical Measurement Methods”. These parallel streams and special sessions provide a platform for synergy and unique cross-over opportunities between biomedical and thermofluids engineering research. To maximise these opportunities the plenary and all keynote lectures were time-tabled as a core activity in a non-overlapping fashion.

In biomedical engineering, the interest in understanding complex biomedical/biological flows, particularly blood flow, at small scales continues to grow. Great advances have been made in both, experimental research and numerical modelling to facilitate improved understanding of physiology and disease, to enhance and provide faster and cost-effective diagnostics as well as to optimise and personalise treatment options. Advances in these areas are reflected in the presented articles of this Special Issue which were selectively invited and passed the journal’s peer review process. In view of optimising systems for the targeted delivery of drugs such as those for cancer treatment Müller *et al* presented on the process of particle margination in blood flow. Vernekar and Krüger reported on their numerical study on the effect of particle volume fraction on the efficiency of deterministic lateral displacement devices which are popular for passive cell sorting in microfluidic applications. Tomaiuolo *et al* investigated the behaviour of red blood cells, particularly their deformability, in micro-confined flow while D’Abolito *et el* tackled microfluidic interactions between red blood cells and drug carriers by image analysis using high-magnification microscopy. Tatsumi *et al* developed a diaelectrophoretic method for manipulation and sorting of particles and lymphocytes using rail-type electrodes. Occhetta *et al* presented on a microfluidic platform designed for high throughput, single cell trapping. Park and Payne modelled the effects of cerebral microvasculature morphology on oxygen transport. The issue concludes with the paper by Vardakis *et al* who investigated cerebral oedema using a multicompartmental poroelastic model to simulate the production and transport of cerebrospinal fluid (CSF).

We would like to thank the Editor for giving us the opportunity to assemble that special issue and all the contributors who accepted our invitation to submit their work in this issue. Biomedical fluid flow at small scale remains a highly active research field and the papers included in this Special Issue present only a snapshot of activities in the field. The 5th International Conference on Micro and Nano Flows will be held in Milan, at the Polytechnico di Milano between the 11th and the 14th of September 2016, (http://www.mnf2016.com/).

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