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PARTICLE METHODS FOR MICRO- AND NANO-FLOWS

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ABSTRACT

Micro- and nano-flows deal with flows occurring within devices or geometries in the size of hundreds of micrometers and smaller and appear in a large range of problems and technological applications. Examples include several biological flows (e.g., microcirculatory blood flow, flow in a lymphatic system) [1] and microfluidic/microrheological devices (e.g., analysis of a microsample, the detection of rare solutes, cell sorting, rheological characterization of complex liquids) [2]. The widespread applicability of micro- and nano-flows has motivated large experimental efforts as well as the investigation of such systems theoretically and/or using numerical simulations. Computer simulations represent an essential complementary tool for understanding flows at micro- and nano-scale, since they allow to switch on and off particular features at will, thus leading to differential understanding of the behavior of an entire system. In this context, *particle methods* (e.g., molecular dynamics, smoothed particle hydrodynamics, dissipative particle dynamics, multi-particle collision dynamics and Brownian dynamics) provide a unique framework since they allow to incorporate easily complex physics, for instance solid/deformable structures immersed in a liquid and thermal fluctuations present at micro- and nano-scales [3].

The main objective of this mini-symposium is to bring together experts in particle-based modeling of micro- and nano-flows in order to discuss and exchange ideas on recent methodological developments and applications in the area. The mini-symposium will include contributions on the modeling of biological flows such as blood flow in microcirculation, modeling of polymeric solutions at atomistic and mesoscopic scales, complex flows in micro- and nano-fluidic devices, and recent developments in particle-based methods. We propose to organize two sessions, where one will focus on biological flow modeling, while the other one will concentrate on microfluidics simulations. We anticipate to have two keynote lectures (one in each session), while the rest of the time will be filled with regular talks.

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