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The flow induced dynamic surface tension effects at nanoscale
ALEX LUKYANOV, University of Reading — The aim of this report is to describe in general the effects of dynamic surface tension solely induced by the flow over nanoscale topography of the substrates. Capillary effects of similar nature induced by chemical modifications of the substrates or by temperature gradients (Marangoni effect) at the solid walls, have already found many applications in microfluidic actuation. The flow induced surface tension effects are examined on the basis of a sharp interface model. It is demonstrated how nanoscale objects placed at the boundary of the flow domain result in generation of substantial surface forces acting on the bulk flow. The effect, studied in general for arbitrary two-dimensional obstacles, is shown to be the strongest for a lattice of one-dimensional threads.

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