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On the roughness-hydrophobicity coupling in nano and microchannel flows MAURO SBRAGAGLIA, Department of Applied Physics, University of Twente, The Netherlands, ROBERTO BENZI, LUCA BIFERALE, Department of Physics, University of Rome Tor Vergata, SAURO SUCCI, FEDERICO TOSCHI, Istituto per le applicazioni del calcolo IAC, Rome — An approach based on a lattice version of the Boltzmann kinetic equation for describing multi-phase flows in nano- and micro-corrugated devices is proposed. We specialize it to describe the wetting/dewetting transition of fluids in presence of nanoscopic grooves etched on the boundaries. This approach permits to retain the essential *supramolecular* details of fluid-solid interactions without surrendering -actually boosting- the computational efficiency of continuum methods. The method is used to analyze the importance of conspiring effects between hydrophobicity and roughness on the global mass flow rate of the microchannel. In particular we show that "smart surfaces" can be tailored to have strongly different mass throughput by changing the bulk pressure. The mesoscopic method is also validated quantitatively against Molecular Dynamics (MD) results of *Cottin-Bizonne et al.* [Nature Mater. **2** 237-240 (2003)].

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