Abstract Submitted
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Modelling of contact angle hysteresis on rough, non-uniform and superhydrophobic surfaces with lattice Boltzmann method[1] K.J. KUBIAK, M.C.T. WILSON, University of Leeds, J.R. CASTREJÓN-PITA, I.M. HUTCHINGS, University of Cambridge — Contact Angle Hysteresis (CAH) is usually attributed to surface heterogeneity, contact line pinning, adsorption or interdiffusion. A model of CAH developed recently by Kubiak & Wilson is demonstrated using the lattice Boltzmann method. The model is based on the dynamic surface heterogeneity, reorientation of surface molecules under wetting liquid, physical roughness, chemical heterogeneity and liquid adhesion and evaporation. Once the surface is wetted, the local static contact angle (CA) changes from its advancing value to match the receding static CA over time Ta. When the contact line retracts, the surface recovers its initial properties corresponding to the advancing static CA over time period Te, which corresponds to the physical evaporation. Further development of the model to include surface roughness and chemical heterogeneity is presented. The model shows good agreement with experimental results for several practical configurations i.e. droplet impact and coalescence, drops on tilted surface, and drops on superhydrophobic and non-uniform surfaces etc. The extended model exhibits great potential for predictive modelling using the lattice Boltzmann method, but can be also implemented in other schemes.

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