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Net Flow in Oscillating Drops activated by Time-periodic Wettability Change JUNG MIN OH, Physics of Complex Fluids Group, TNW, University of Twente, 7500AE Enschede, The Netherlands, DOMINIQUE LEGENDRE, Université de Toulouse, INPT, UPS, Institut de Mécanique des Fluides de Toulouse (IMFT), Allée Camille Soula, F-31400 Toulouse, France, FRIEDER MUGELE, Physics of Complex Fluids Group, TNW, University of Twente, 7500AE Enschede, The Netherlands — We use numerical (volume of fluid) simulations to study the net flow in sessile drops driven to oscillate at variable frequency by time-periodic variations of the wettability. Superimposed onto an oscillatory component, we find a net flow oriented upward along the surface from the contact line towards the apex and downward along the symmetry axis of the drop. Analyzing the trajectories of Lagrangian tracer particles, we find that the velocity of the mean flow vanishes at high and low drive frequencies with a broad maximum in between in agreement with recent experimental observations [Mugele et al. Lab Chip 2011]. Superimposed onto this general trend sharp maxima appear at frequencies corresponding to even shape modes of the drops, with an absolute maximum at the resonance frequency of the P_6 mode. The overall trend follows the behavior expected from a Stokes drift model.

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