Abstract Submitted
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A computational study of the impingement of water droplets onto freezing superhydrophobic surfaces[1] WEN JIN, BEHROOZ AMIRZADEH, MAZDAK TOOTKABONI, MEHDI RAESSI, University of Massachusetts Dartmouth, UNIVERSITY OF MASSACHUSETTS DARTMOUTH TEAM — We present computational simulations of the impingement of micron-size water droplets onto freezing superhydrophobic surfaces at various Weber numbers, droplet initial temperatures, and surface temperatures. The simulation results are from an in-house volume-of-fluid based, free-surface flow solver with phase change. The objective is to investigate the conditions under which the droplets bounce off the surface or stick to the surface and freeze. The transition between the bouncing and sticking regimes is shown. Then, using a dimensional analysis of the timescales for droplet freezing and drop-surface contact, a theoretical model is proposed for predicting the above transition. Finally, the predictions of the theoretical model are compared to the transition conditions observed in the computational simulations.

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Mehdi Raessi
University of Massachusetts Dartmouth

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