Modeling waves forced by a drop bouncing on a vibrating bath\textsuperscript{1}

SAM TURTON, RUBEN ROSALES, JOHN BUSH, MIT — We study the wave-field generated by a droplet bouncing on a bath of silicon oil undergoing vertical oscillations. Such droplets may bounce indefinitely below the Faraday threshold, and in certain parameter regimes destabilize into a walking state in which they are propelled by their own wavefield. While previous theoretical models have rationalize the behavior of single droplets, difficulties have arisen in rationalizing the behavior of multi-droplet systems. We here present a refined wave model that allows us to do so. In particular, we give a detailed account of the spatio-temporal decay of the waves, in addition to the coupling between the wave amplitude and modulations in the droplets vertical dynamics. Our analytic model is compared with the results of direct numerical simulations and experiments.

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