

Abstract Submitted  
for the DFD20 Meeting of  
The American Physical Society

**Interaction of two non-coalescing bubbles rising in a non-isothermal self-wetting fluid**<sup>1</sup> KIRTI SAHU, Indian Institute of Tech Hyderabad, MOUNIKA BALLA, IIT Hyderabad, MANOJ KUMAR TRIPATHI, IISER Bhopal, OMAR K MATAR, Imperial College London — The attractive and repulsive behaviours of a pair of initially spherical gas bubbles rising side-by-side in a channel with non-uniformly heated walls containing a self-wetting liquid are investigated numerically. The surface tension of a self-wetting fluid exhibits a parabolic temperature dependence with a well-defined minimum, as opposed to linear (common) fluids whose surface tension decreases almost linearly with the increasing temperature. It is found that, for low Reynolds numbers, while in an isothermal medium, two gas bubbles display a repulsive behaviour, they attract in non-isothermal systems. The bubbles in the self-wetting fluid undergo a plastic collision and show a ‘squeezing and relaxing’ behaviour, whereas they attract and then bounce in the linear fluid. A regime map demarcating the repulsive and attractive behaviours for a self-wetting fluid is plotted in the Weber number and the dimensionless linear component of the surface tension gradient space. The mechanism underlying the observed phenomenon is elucidated by studying the drag and lift forces acting on the bubbles, their orientations, and the flow field around them.

<sup>1</sup>K. C. S. thanks Science and Engineering Research Board, India for providing financial support through the grant number, MTR/2017/000029.

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Date submitted: 26 Jul 2020

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