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Heat transport by bubbles in vertical natural convection[1] CHONG SHEN NG, University of Twente, ROBERTO VERZICCO, University of Rome Tor Vergata, DETLEF LOHSE, University of Twente — We consider a basic configuration of bubbles in vertical natural convection. The datasets are obtained from direct numerical simulations for one decade of Rayleigh numbers, a Prandtl number of 7 and the bubbles are simulated with immersed boundaries using the interaction potential approach. By separately enabling the thermal and mechanical coupling, we show evidence that the heat transport is enhanced when the bubbles are both thermally and mechanically coupled to the flow. When only pure mechanical coupling is considered, we instead find a lower heat flux in the system. The enhanced heat flux from the addition of thermal coupling highlights the importance of thermal transport by bubbles in this setup. To shed light on the details of the mechanism, we discuss the contributions to the heat flux with reference to local statistics of the thermal boundary layers.

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Chong Shen Ng
University of Twente

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