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Effect of Bubble Deformability in Multiphase Turbulent Channel Flows[1] SADEGH DABIRI, University of Notre Dame, JIACAI LU, Worcester Polytechnic Institute, GRETAR TRYGGVASON, University of Notre Dame — Recent results of direct numerical simulations (DNS) of deformable bubbles in turbulent upflows in vertical channels are discussed. Earlier results have shown that the lift forces leading to a lateral migration of nearly spherical bubbles controls the flow. In weakly turbulent flows, nearly spherical bubbles form a dense bubbly wall-layer but more deformable bubbles stay away from the walls, resulting in very different flow structures and flow rates. The different flow regimes have a very simple structure, but it is necessary to examine the collective motion of many bubbles rather than individual ones to predict the void fraction profile. Here the transition from one flow regime to the other as the deformability of the bubbles is changed is examined. We show that as long as the bubbly wall-layer is maintained, the flow rate increases slowly with the bubble deformability, but once the bubbles are sufficiently deformable and leave the wall, there is a sharp increase in the flow rate.

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