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Bubble Interactions in Multiphase Turbulent Channel Flows[1] JIACAI LU, Worcester Polytechnic Institute, GRETAR TRYGGVASON, University of Notre Dame — Direct numerical simulations of deformable bubbles in weakly turbulent upflows in vertical channels have shown that the flow has a remarkably simple structure. For upflow, lift forces drive nearly spherical bubbles to the walls, forming a bubble-rich wall-layer. For downflow the bubbles are, on the other hand, driven away from the walls, creating a bubble free wall-layer. In both cases the addition or removal of bubbles to the center continues until the two-phase mixture there is in hydrostatic equilibrium. The lift on deformable bubbles is, however, generally nearly zero and the bubbles do not migrate laterally, on the average. Here we examine the effect of the size of the computational domain, and the number of bubbles, as well as the effect of including bubbles of different sizes. The results show that the distribution of bubbles sliding along the walls in upflow is generally very uneven, with parts of the wall crowded with bubbles and other parts bubble free. The presence of larger bubbles also tends to cause large fluctuations in the flow, including disrupting the wall-layers.

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