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DNS of multifluid flows in a vertical channel undergoing topology changes[1] JIACAI LU, GRETAR TRYGGVASON, Johns Hopkins University — Multifluid flows in a vertical channel are examined by direct numerical simulations, for situations where the topology of the interface separating the different fluids changes. Several bubbles are initially placed in a turbulent channel flow at a sufficiently high void fraction so that the bubbles collide and the liquid film between them becomes very thin. This film is ruptured at a predetermined thickness and the bubbles are allowed to coalesce. For low Weber numbers the bubbles continue to coalesce, eventually forming one large bubble. At high Weber numbers, on the other hand, the large bubbles break up again, sometimes undergoing repeated coalescence and breakup. The evolution of various integral quantities, such as the average flow rate, wall-shear, and interface area are monitored and compared for different governing parameters. Various averages of the flow field and the phase distribution, over planes parallel to the walls, are examined and compared, and the microstructure of bubbles, at statistically steady state, is examined using low order probability functions.

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