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Simulating high void fraction flows undergoing massive topology changes in vertical channels[1] JIACAI LU, GRETAR TRYGGVASON, Johns Hopkins University — Turbulent multifluid flows in vertical channels, where the topology of the interface between the different fluids repeatedly changes due to the breakup and coalescence of fluid masses, are examined by numerical simulations, using a finite volume/front-tracking method where the interface is tracked by connected marker particles and the flow equations solved on a regular structured grid. When a film of one fluid, separating blobs of a different fluid, becomes sufficiently thin, it is ruptured. At low volume fraction of one phase, one phase usually consists of disperse drops or bubbles, but as its volume fraction increases the interface structures changes from to more complex irregular shapes, where each fluid is often highly interconnected. Here the focus is on flows where the volume fractions are comparable. The evolution of various integral quantities, such as the average flow rate, wall-shear, and interface area and structure are monitored and compared for different governing parameters such as void fraction and Weber number. Various averages of the flow field and the phase distribution, over planes parallel to the walls, are examined and compared, and the microstructure is examined using two-point correlation functions and other measures.

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