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Bubble coalescence in channels flows[1] JIACAI LU, GRETAR TRYGGVASON, University of Notre Dame — Direct numerical simulations (DNS) of bubbly flows in vertical channels have shown that the steady state flow structure is particularly simple and can be described by relatively elementary considerations. Similarly, DNS have been used to examine the transient evolution of both laminar and turbulent channel flows, also leading to considerable increase of the understanding of such flows. However, as the void fraction increases the assumption of bubbly flows becomes unrealistic and it is necessary to account for topological changes through coalescence and breakup and flow regime transitions. Here the transition of high void fraction laminar bubbly flows to slug flow is examined by DNS, using a front tracking method where the exact coalescence criteria can be changed and its effect studied. To quantify the transition we monitor the flow rate and the wall shear, as well as the interface structure, including the different components of the area concentration tensor, which gives the projection of the bubble surface area in different directions. The effect of the precise representation of when and how coalescence takes place is also studied. Preliminary results for turbulent flows, where both coalescence and breakup take place are also shown and the use the results to aid in the developm

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