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Bubble migration and coalescence in rotating flows WEN LIU, Changzhou University School of Petroleum Engineering, P. R. China, JIACAI LU, GRETAR TRYGGVASON, Johns Hopkins University Department of Mechanical Engineering, USA — The collective buoyant motion of bubbles in a fluid rotating around a vertical axis is studied by numerical simulations, using a front tracking method to capture the interface between the gas and the liquid. The fully three-dimensional flow is resolved using stretched grids, allowing us to simulate large domains that are well resolved near the rotation axis. The computational domain rotates with the fluid, giving rise to fictitious forces (centrifugal and Coriolis) due to a non-inertial frame, and is periodic in the vertical direction. We verify the numerical setup and the numerical approach by comparisons with published studies of single bubbles and drops. The bubbles are driven to the axis of rotation at a rate that depends on the problem parameters, sometimes forming a gas column if they coalesce. The bubbles also rise due to buoyancy and we examine how the relative strength of rotation and buoyancy affects the dynamics. We identify how the dynamics depends of the governing numbers, identify the transition boundaries, and propose a flow pattern map.

Wen Liu
Changzhou University School of Petroleum Engineering, P. R. China

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