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**Instability of a negatively-buoyant fountain**[1] PETER FRIEDMAN, VIDYA VADAKOOT, WILLIAM MEYER, University of Massachusetts Dartmouth — Experimental simulations were carried out to investigate the stability of negatively buoyant fountains by injecting glycerin-water mixtures into silicon oil and imaging the flow structure using PIV. The transition from a stable to an unstable fountain structure is strongly controlled by the Richardson number of the jet, and to a lesser extent, Reynolds number, viscosity ratio, Weber number and Vent geometry. Transition occurs at a nominal Ri = 1.0. In a cylindrical vent geometry, the only effect of the Reynolds number is in determining whether or not the fountain is laminar or turbulent, which can be fully accounted for by basing the Richardson number on the Root mean Square of the mean velocity. Viscosity ratio deviating from unity has the effect of stabilizing the flow structure and thereby reducing the Richardson number for transition to an unstable flow structure. Similarly, interfacial tension stabilizes the flow pattern resulting in a trend of increasing transition Richardson number with increasing Weber number. The results are valid in rectangular vents if the Richardson number and Reynolds number are based on the hydraulic diameter.

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