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Buoyancy Driven Mixing with Continuous Volumetric Energy Deposition ADAM J. WACHTOR, FARZANEH F. JEBRAIL, NICHOLAS A. DENNISEN, MALCOLM J. ANDREWS, ROBERT A. GORE, Los Alamos National Laboratory — An experiment involving a miscible fluid pair is presented which transitioned from a Rayleigh-Taylor (RT) stable to RT unstable configuration through continuous volumetric energy deposition (VED) by microwave radiation. Initially a light, low microwave absorbing fluid rested above a heavier, more absorbing fluid. The alignment of the density gradient with gravity made the system stable, and the Atwood number (At) for the initial setup was approximately -0.12. Exposing the fluid pair to microwave radiation preferentially heated the bottom fluid, and caused its density to drop due to thermal expansion. As heating of the bottom fluid continued, the At varied from negative to positive, and after the system passed through the neutral stability point, $At = 0$, buoyancy driven mixing ensued. Continuous VED caused the At to continue increasing and further drive the mixing process. Successful VED mixing required careful design of the fluid pair used in the experiment. Therefore, fluid selection is discussed, along with challenges and limitations of data collection using the experimental microwave facility. Experimental and model predictions of the neutral stability point, and onset of buoyancy driven mixing, are compared, and differences with classical, constant At RT driven turbulence are discussed.

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