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Evolution of turbulent jets in low aspect ratio containers[1] S. POL, C. NATH, D. GEST, S. VOROPAYEV, H.J.S. FERNANDO, Arizona State University, S. WEBB, Sandia National Labratories — The evolution of homogeneous and buoyant turbulent jets released into a low aspect ratio (width/height) container was investigated experimentally using PIV, MSCT probing and digital imaging. The motivation was to understand mixing process occurring in U.S. Strategic Petroleum Reserves (SPR), where crude oil is stored in salt caverns of low aspect ratio. During maintenance or filling, oil is introduced as a jet from the top of the caverns. This study is focussed on mean and turbulent flow characteristics as well as global flow instability and periodic oscillations intrinsic to jets in low aspect ratio containers. Scaling arguments were advanced for salient flow parameters, which included the characteristic length (container width D) and velocity (for homogeneous jets, $J^{1/2}D$, where J is the momentum flux at the jet exit) scales. For buoyant jets, the buoyancy flux B needs to be introduced as an additional parameter. Such jet flows do not reach a steady state, but bifurcate periodically with a frequency scale $J^{1/2}/D^2$ while enhancing global mixing.

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