Pressure-driven miscible two-fluid channel flow with density gradients[1] HANG DING, KIRTI SAHU, PRASHANT VALLURI, OMAR MATAR, Imperial College London — We study the effect of buoyancy on pressure-driven flow of two miscible fluids in inclined channels via direct numerical simulations. The flow dynamics are governed by the continuity and Navier-Stokes equations, without the Boussinesq approximation, coupled to a convective-diffusion equation for the concentration of the more viscous fluid through a concentration-dependent viscosity and density. The effect of density ratio, Richardson number, and channel inclination on the flow dynamics is examined, for moderate Reynolds numbers and viscosity ratios. We present results showing the spatio-temporal evolution of the flow together with an integral measure of mixing.

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