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Turbulent Entrainment into Non-Newtonian Fluid Mud Gravity Currents MICHAEL JACOBSON, FIRAT TESTIK[1], Clemson University — This study presents insights into turbulent entrainment of ambient water into fluid mud gravity currents. It is well established that fluid mud suspensions exhibit pseudo-plastic behavior. Gravity current laboratory experiments were conducted for constant-volume release configuration with different initial concentrations of fluid mud, representing different rheological properties (i.e. different Power-law model constants). A high quality data set of concentration and velocity profiles of fluid mud gravity currents was collected to calculate the entrainment velocity, w_e. The entrainment ratio ($E = w_e/U, U$ – characteristic velocity) was calculated following the well-accepted Morton-Taylor-Turner entrainment hypothesis, which states that the inflow across the edge of a turbulent flow is proportional to some characteristic velocity. The entrainment ratio was further measured qualitatively using a light opaqueness technique. A semi-empirical parameterization for the entrainment ratio is proposed. The findings of this study are expected to be of significance for modeling various non-Newtonian gravity currents, in particular for modeling fluid mud gravity currents generated during dredge disposal operations in coastal waters.

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