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Navier-Stokes based linear stability analysis of submarine channel formation by turbidity currents BRENDON HALL, ECKART MEIBURG, UCSB — Submarine channels represent common features on the continental shelf. They are formed, and in turn affect, sediment transport from shallow to deeper waters. We perform a Navier-Stokes based linear stability analysis, based on the Boussinesq approximation, to assess turbidity currents as a potential mechanism for the initiation of such channels. A one-dimensional base state is assumed for the streamwise velocity and the particle loading, and the fluid/substrate interface evolves according to a balance of erosion and sedimentation. The stability analysis demonstrates that a perturbation of this balance results in local variations of particle concentration, which in turn lead to the formation of counterrotating, streamwise vortex pairs. These modify the local balance of erosion and sedimentation such as to amplify the initial perturbation. Dispersion relationships are presented in order to evaluate the influence of the governing dimensionless parameters. The ratio of the particle concentration and velocity boundary layer thicknesses is seen to be important.

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