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Sedimentation dynamics of disks in a linearly stratified fluid MATTHIEU MERCIER, JUSTIN PEMEJA, PATRICIA ERN, IMFT (Institut de Mecanique des Fluides de Toulouse) — The settling dynamics of small objects in a stratified fluid is important to understand the fate of the biomass in lakes or oceanic environments, for industrial applications such as waste-water disposal for instance. Recent numerical and theoretical studies dedicated to freely falling (or rising) bodies in stratified environments have shown some important differences compared to the same problem in a homogeneous fluid. Experimental results are still needed for validation, especially at low and moderate values of the Reynolds number, $Re = Ud/\nu \leq 100$, with U the instantaneous vertical velocity of the object, d its characteristic length, and ν the kinematic velocity of the fluid. We present original experimental results of freely falling disks of finite thickness in a linearly stratified fluid. Three-dimensional trajectories and the wake of the object are obtained using a pair of cameras visualizing two perpendicular planes, revealing a strong influence of the stratification on the dynamics of the object. In particular, the stratification enhances the steady drag experienced by the disks when falling broadside; and generates a change of stability for the disk orientation (from horizontal to vertical) when the Re number decreases below a threshold value.

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