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Fluttering in Stratified Flows TRY LAM, LIONEL VINCENT, EVA KANSO, Univ of Southern California — The descent motion of heavy objects under the influence of gravitational and aerodynamic forces is relevant to many branches of engineering and science. Examples range from estimating the behavior of re-entry space vehicles to studying the settlement of marine larvae and its influence on underwater ecology. The behavior of regularly shaped objects freely falling in homogeneous fluids is relatively well understood. For example, the complex interaction of a rigid coin with the surrounding fluid will cause it to either fall steadily, flutter, tumble, or be chaotic. Less is known about the effect of density stratification on the descent behavior. Here, we experimentally investigate the descent of discs in both pure water and in a linearly salt-stratified fluids where the density is varied from 1.0 to 1.14 of that of water where the Brunt-Vaisala frequency is 1.7 rad/sec and the Froude number $Fr < 1$. We found that stratification enhances the radial dispersion of the disc at landing, and simultaneously, decrease the descent speed and the inclination (or nutation) angle while falling. We conclude by commenting on the relevance of these results to the use of unpowered vehicles and robots for space exploration and underwater missions.

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