Abstract Submitted
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Entrainment Phenomena in Potential Flow: Brachistochrones and Finite-Time Corrections to Darwin's Drift Volume[1] MATTHEW MOORE, RICH MCLAUGHLIN, ROBERTO CAMASSA, ASHWIN VAIDYA, University of North Carolina - Chapel Hill, UNC RTG FLUIDS GROUP TEAM — For a body moving uniformly in an ideal fluid there exists a region in which particles are swept in the same direction as the motion of the body, called the drift region, as well as a region in which particles are forced in the opposite direction as that of the body, called the reflux region. In Darwin's Theorem, the drift volume is defined as the volume swept out by particles originating on a plane perpendicular to the motion of the body, as the body moves from an infinite distance upstream of the plane to an infinite distance downstream of the plane. Here, we present finite-time corrections to Darwin's calculation of the drift volume for a sphere, which extend the previously obtained semi-infinite correction of Eames, Belcher, and Hunt (1994). Additionally, we solve the problem of finding the particle who minimizes its time of flight for uniform flow past a sphere. The path of this particle who minimizes flight time is termed the brachistochrone path, and a connection is drawn to the geometry of the reflux region.

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