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The motion of helical vortices OSCAR VELASCO FUENTES, Departamento de Oceanografia Fisica, CICESE, Mexico. — We study the motion of a helical vortex in an inviscid, incompressible fluid of infinite extent. The vortex is a thin tube, of circular cross section and uniform vorticity, whose centerline is a helix of uniform pitch. Ever since Joukowsky (1912) deduced that this vortex is a steady solution of the Euler equations, numerous attempts have been made to compute its self-induced velocity. Here we use Hardin's (1982) solution for the velocity field in order to compute, for any pitch value, the linear and angular velocities of the vortex. Our formulas were verified by direct numerical integration of both the Biot-Savart and Helmholtz equations, and were also found to compare favourably with previous theoretical results. In terms of the vortex capacity to transport fluid, we identified three regimes: a helix of large pitch moves slowly, carrying a large mass of fluid; a thin helix of small pitch moves fast, carrying a small mass of fluid; and a fat helix of small pitch is a moderate carrier itself but it pushes fluid forward along its axis.

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