Topological Helical Vorticity Compression in Ideal Fluids
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logical conserved quantity arises in ideal fluids whenever the helicity vanishes in
such a way that the vorticity field is tangent to a family of surfaces. We give exam-
pies of vorticity fields for which this quantity does not vanish, and interpret it as
measuring helical compression of vortex lines. We show that if this invariant does
not vanish then the flow is not steady, giving a topological obstruction for a vorticity
field to come from a steady flow. Finally we discuss relations to the Hamiltonian
formulation of the Euler equations.