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Aeroacoustics of viscous vortex reconnection PEDRO PAREDES, Universidad Politecnica de Madrid, JOSEPH W. NICHOLS, KARTHIK DURAISAMY, Stanford U., FAZLE HUSSAIN, U. of Houston — Reconnection of two anti-parallel vortex tubes is studied by direct numerical simulations and large-eddy simulations of the incompressible Navier-Stokes equations over a wide range (2000-50,000) of the vortex Reynolds number (Re). A detailed investigation of the flow dynamics is performed and at high Re, multiple reconnections are observed as the newly formed "bridges" interact by self and mutual induction. To investigate acoustics produced by the recoil action of the vortex threads, Möhring's theory of vortex sound is applied to the flow field and evaluated at varying far-field locations. The acoustic solver is verified against calculations of laminar vortex ring collision. For anti-parallel vortex reconnection, the resulting far-field spectra are shown to be grid converged at low-to-mid frequencies. To assess the relevance to fully turbulent jet noise, the dependence of reconnection upon Reynolds number is investigated.

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