Abstract Submitted
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Topology and dissipation during vortex reconnection ROBERT M. KERR, University of Warwick — The evolution of the vortical,topological and geometric properties of several configurations of vortices are compared. Trefoil vortex knots, coiled rings, anti-parallel perturbed vortices and colliding rings and one goal is to identify what the influence twist, writhe, linking numbers and helicities have upon the generation, or suppression, of energy dissipation. The focus will be upon the latest anti-parallel vortices reconnection calcualtions for which the growth of the enstrophy Z, the volume-integrated vorticity squared, is consistent with ν-independent energy dissipation $\Delta E_\epsilon = \int_0^{t_\epsilon} \epsilon \, dt$, $\epsilon = \nu Z$ when the Reynolds number is high enough and the domain is large enough. This is consistent with the ν-independent growth of ϵ for trefoil vortices (JFM 839, R2, 2018) and the type of reconnection structures observed when vortex rings collide (McKeown et al. PR Fluids 3, 124702, 2018). However, the $Z \sim (T_c(\nu) - t)^{-2}$ (or linear $\mathrm{B}_\nu(t) = (\sqrt{\nu} Z)^{-1/2}$) regime seen for trefoils and nested coiled rings (JFM 854, R2, 2018) is not observed. Could the geometric numbers and helicity be why? The helicity of anti-parallel vortices is identically zero, while the others' topological helicity=twist+writhe is large.

Robert M. Kerr
University of Warwick

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