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Evolution in the outer domains of Navier-Stokes could allow finite-time dissipation to form without singularities. ROBERT KERR, Univ of Warwick — Could the enstrophy Z scaling regime $\sqrt{\nu}Z$ originally identified during trefoil vortex knot reconnection (JFM 839, R2, 2018), be universal? And can it lead to finite energy dissipation $\Delta E_\epsilon = \int_0^{t_\epsilon} \epsilon\, dt$ as $\nu \to 0$? This reconnection regime is characterized by linear $B_\nu(t) = (\sqrt{\nu}Z(t))^{-1/2}$ up to a time t_x with fixed $B_\nu(t_x)$. Its enstrophy growth for $T_c(\nu) > t_x$ is $Z_\nu(t) \sim \nu^{-1/2}(T_c(\nu) - t)^{-2}$, giving an energy dissipation rate $\epsilon(t_x) = \nu Z(t_x) \to 0$ as $\nu \to 0$. Nested coiled rings also have this scaling as they reconnect. Recently, two anti-parallel vortex calculations have gotten $B_\nu(t)$ scaling during reconnection, identified by finite circulation exchange $\Delta\Gamma$. For trefoils, finite ϵ appears at $t_\epsilon \approx 2t_x$, with similar results for very long anti-parallel vortices. By taking advantage of the anti-parallel symmetries, the new high-resolution data can identify a front perpendicular to the line of reconnection that would be blocked if the domains were fixed, perhaps explaining why the $B_\nu(t)$ scaling requires growing domains. These finite-time events are consistent Sobolev regularity inequalities, forming finite ΔE without singularities.

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