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Creation and Dynamics of Knotted Vortices DUSTIN KLECKNER, MARTIN SCHEELER, WILLIAM IRVINE, University of Chicago — Fluid vortex loops linked together or tied into knots are the basis of a topological interpretation of fluid mechanics. In perfect fluids, the linking of vortex lines is preserved indefinitely and associated with a conserved quantity known as helicity. The situation is considerably more complicated in real fluids - even superfluids - because the vortex topology can change through local reconnections whose dynamics are not well understood. Previous attempts to study these phenomena in experiments have failed because no controlled method existed for making vortex knots in the laboratory. We will describe a method we recently developed for making knotted and linked vortices using 3D-printed hydrofoils. We measure the subsequent evolution of the vortex structures using high-speed laser scanning tomography. We observe that they spontaneously untie/unlink themselves through a series of local reconnections, which we resolve in detail.

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