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Quasi-steady linked vortices with chaotic streamlines OSCAR VELASCO FUENTES, ANGELICA ROMERO ARTEAGA, CICESE — We study the dynamics of two or more toroidal filamentary vortices —i.e. thin tubular vortices coiled on an immaterial torus— in an otherwise quiescent, ideal fluid. Assuming that the vortices are identical and equally spaced on a meridional section of the torus, the flow evolution depends on the torus aspect ratio (R), the number of vortices (N), and the vortex topology ($V_{p,q}$, where p and q are coprime integers such that the $V_{p,q}$ vortex winds p times round the torus symmetry axis and q times round the torus centerline). The evolution of sets of $V_{1,1}$ and $V_{1,2}$ vortices was computed using the Rosenhead–Moore approximation to evaluate the velocity field and a fourth-order Runge-Kutta scheme to advance in time. It was found that vortex sets with $N < 6$ and $R < 0.15$ progressed along and rotated around the torus symmetry axis in an almost steady manner while each vortex in the set approximately preserved its shape. The velocity field, observed in the comoving frame, has two stagnation points. The stream tube starting at the forward stagnation point and the stream tube ending at the backward stagnation point transversely intersect along a finite number of streamlines. The three-dimensional chaotic tangle that arises has a geometry which depends primarily on the number of vortices N.

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