The evolution of some geometric structures under the Euler and Navier-Stokes equations

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In this talk we will be interested in the evolution under the Euler and Navier-Stokes equations of several geometric structures defined by the vorticity of the fluid. First we will see how vortex lies and vortex tubes of complicated topologies are created and destroyed in the 3D Navier-Stokes equations. Next we will consider the emergence of non-smooth interfaces of surprising geometry in the free boundary Euler equations. The talk is based on joint work with D. Córdoba, N. Grubic, R. Lucà and D. Peralta-Salas.