

In 1858, Helmholtz predicted that two vortex-rings in fluids will pass through each other and become leapfrogging. In this talk I will give a rigorous justification of Helmholtz's conjecture for 3D Euler flow, and also discuss the dynamical desingularization of vortices for 2D Euler flows. The key ingredients are new gluing methods for Euler flows. (Joint work with Juan Davila, Manuel del Pino and Juncheng Wei).