Early Career Talk

Corner singularity in the polygonal vortices and in the reconnection phenomenon

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The reconnection of vortices gives rise to cascade coherent structures. These structures have a characteristic shape that includes a horseshoe and helical waves. A reminiscent shape is presented in the evolution of a corner of an infinitely thin polygonal vortex subject to the localized induction approximation (LIA). One may ponder the question: do vortices form a corner singularity during the reconnection, and what are the characteristic features of this singularity? A possible way to check this is to analyze the behavior of the vortices after the reconnection. In this talk a LIA-based model of vortex reconnection is considered. We show that some feature of the vortex behavior presented for the polygonal vortex can be also observed for the considered model. In particular, we can note the axis switching and dominance of frequencies corresponding to squares of integers in the Fourier spectra of the corner trajectory and the fluid impulse. These features, up to some approximation, appear in the solution of the Navier-Stokes equations for the reconnection of antiparallel vortices with finite thickness.