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Title: Singularity analysis for the regularized Euler- α motion of a vortex sheet

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Abstract: We present in this talk a numerical analysis concerning the regularization of a vortex sheet motion governed by Birkhoff-Rott (BR) equation for a flow induced by an infinite array of planar vortex sheets. The Euler- α regularization applied to the BR equation is considered, and its solutions are compared with the dynamics of the non-regularized vortex sheet by means of the analysis of the complex singularities of the solutions through the singularity tracking method. We show that the regularized solution has several complex singularities that approach the real axis, and we relate their presence to the formation of high-curvature points in the vortex sheet during the roll-up phenomenon. The motion of the sheet in the Euler- α regularization is shown to be compatible also with the motion of a viscous layer of non-uniform vorticity governed by the Navier-Stokes equation in the zero viscosity limit. A numerical analysis of the complex singularities of the curve supporting the vortex layer is carried out and results are compared with those obtained from the same analysis for the Euler- α vortex sheet case.

This is a joint work with Marco Sammartino and Vincenzo Sciacca (Dept. Math., Univ. Palermo).