Numerical computation of vortex sheet roll-up in the background shear flow

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The motion of a planar vortex sheet in the presence of a uniform shear flow is considered. We use the same numerical method as Krasny in his study of vortex sheets, namely, Chorin’s vortex blob method. A linear analysis shows that the background shear influences the motion of the vortex sheet in such a way that with respect to low frequency modes it is stabilized in some cases. We examine this phenomenon not only by the linear analysis but also by a numerical simulation of the nonlinear integral equation. In particular, we note carefully how the number and the location of the roll-ups of a vortex sheet change as the strength of shear changes.

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