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Vortex Sheet Model for a Turbulent Mixing Layer UJJAYAN PAUL, RODDAM NARASIMHA, MEHEBOOB ALAM, JNCASR, Jakkur, Bangalore 64 — The primary aim of this work is to study instability induced roll up of a slightly perturbed vortex sheet in an Euler fluid. A point vortex model tends to evolve into a chaotic cloud of point vortices instead of smooth double branched spirals. The present model uses linear splines to interpolate the vortex sheet. Computer simulation of this vortex sheet is numerically prohibitive. However, the evolution of the vortex sheet can be performed conveniently using a closed form equation of motion which derived from the basic equations of vortex dynamics. The vortex sheet rolls up into a smooth double branched spiral. A vortex core is formed by regular windings of the vortex sheet and irrotational fluid in between the layers. Various statistical quantities like the growth rate and mean velocity profiles are computed along with the evolution of the vortex sheet. The problem of spontaneous appearance of singularity in an evolving vortex sheet is treated in detail. The critical time for the present vortex sheet model is calculated analytically and compared to the numerical value.

Ujjayan Paul
JNCASR, Jakkur, Bangalore 64

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