

Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Direct numerical simulations of vortex ring collisions RODOLFO OSTILLA MONICO, Harvard University, ALAIN PUMIR, ENS Lyon, MICHAEL BRENNER, Harvard University — We numerically simulate the ring vortex collision experiment of Lim and Nickels (Nature, 357:225-227, 1992) in an attempt to understand the rapid formation of very fine scale turbulence (or 'smoke') from relatively smooth initial conditions. Reynolds numbers of up to $Re = \Gamma/\nu = 7500$, where Γ is the vortex ring circulation and ν the kinematic viscosity of the fluid are reached, which coincide with the highest Reynolds number case of the experiments. Different perturbations to the ring vortex are added, and their effect on the generation and amplification of turbulence is quantified. The underlying dynamics of the vortex core is analyzed, and compared to the dynamics arising from a simple Biot-Savart filament model for the core.

Rodolfo Ostilla Monico
Harvard University

Date submitted: 29 Jul 2016

Electronic form version 1.4