Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

A bursting phenomenon in a vortex-gas boundary layer AARTHI SEKARAN, RODDAM NARASIMHA, Jawaharlal Nehru Centre for Advanced Scientific Research, RAMA GOVINDARAJAN, TIFR Centre for Interdisciplinary Sciences — Bursts are a central phenomenon in turbulent boundary layers as they are an integral part of turbulent energy and stress production. They have consequently been a continuing area of interest since the 1970s following the detailed investigations of Kline et al. (1967). Despite several attempts to understand their dynamics, it has been difficult to arrive at a consensus even on the scaling of the burst frequency. The present investigation simulates the outer part of a plane turbulent boundary layer using the vortex-gas model, in a first step towards understanding the role of the outer layer in boundary layer dynamics. Preliminary results indicate the formation of regions of concentrated vorticity near the wall, at a frequency that is independent of the initial vortex configuration but a function of the mean velocity profile. Further, comparisons with existing experimental data indicate a burst frequency which when scaled on outer variables, is within the range of scatter among different studies. Quadrant occupancy statistics are also related to those in conventional boundary layers. It appears as if a bursting phenomenon of some kind may be a general feature of an inviscid, wall-bounded shear flow, and does not necessitate inclusion of either viscosity or three-dimensionality.

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Date submitted: 01 Aug 2014 Electronic form version 1.4