

Abstract Submitted  
for the DFD12 Meeting of  
The American Physical Society

**Dynamics of the collision of a vortex ring with a vertical heated wall** G. GELDERBLUM, University of Twente, C.A. PALACIOS-MORALES, R. ZENIT, F.J. SOLORIO-ORDAZ, Universidad Nacional Autonoma de Mexico — We study the dynamics of the impact of a vortex ring with a vertical heated plate (at constant temperature). Laminar vortex rings were generated with a piston cylinder arrangement. The vertical wall is heated by a thermal bath which is held at constant temperature producing a laminar and stable thermal boundary layer. Measurements of the 2D velocity field were obtained with a PIV technique. The experimental results for the isothermal case are in agreement with previous investigations reported in the literature. To avoid azimuthal instabilities, we mainly conducted experiments for  $L/D_0 = 1$  (where  $L$  is the piston displacement and  $D_0$  is the cylinder inner diameter) with different wall temperatures and vortex translation velocities. For this case, secondary vortices were not observed. Using ink visualization we observed the evolution of the vortex shape. The initial circular shape evolves into a “cat head” shape after reaching the wall. The top and bottom regions of the vortex reduce and increase their vorticity, respectively. The sides are stretched and convected. An analysis of the different mechanisms leading to this shape evolution is presented and discussed.

Roberto Zenit  
Universidad Nacional Autonoma de Mexico

Date submitted: 10 Aug 2012

Electronic form version 1.4