Abstract Submitted for the DFD09 Meeting of The American Physical Society

Dynamics of collision of a vortex ring and a planar surface¹ MICHAEL MCERLEAN, MICHAEL KRANE, ARNOLD FONTAINE, ARL Penn State — The dynamics of the impact between a vortex ring and a planar surface orientated perpendicular to the direction of travel are presented. High Reynolds number vortex rings are injected into a quiescent tank of water using a piston-cylinder generator before colliding with a target at a long distance. Both the pressure at the stagnation point on the surface and the force imparted to the target by the ring impact are measured directly. The changes in both are related to the ring motion and deformation captured by high speed digital video, and DPIV measurements. These relations are used to develop a scaling law relation between impact force and vortex ring circulation, speed, and size.

¹Acknowledge support of NAVSEA and NIH.

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Date submitted: 11 Aug 2009 Electronic form version 1.4