

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Vortex ring impacting on wall JING LOU, MING CHENG, Institute of High Performance Computing, LI-SHI LUO, Old Dominion University, IHPC TEAM, LI-SHI LUO COLLABORATION — Three dimensional vortex ring impacting a wall at different angles of incidence has been numerically investigated using the lattice Boltzmann model. The detailed flow behavior, vortex evolution, and pressure distribution on wall have been studied systematically with the Reynolds number of $100 < \text{Re} < 1000$, and the impact angle of the range of $0^\circ < \theta < 60^\circ$. Our results show that only when $\text{Re} > 100$, the interaction of the vortex ring with the wall can generate the secondary vortex rings. The evolution of vortex structure is also strongly influenced by θ . The increase of θ will cause a wrap process of the secondary vortex ring and an obvious suppression of the tertiary vortex ring generation. Further more, the study identified new features of vortex structure and its interaction with wall, in particular, for the oblique impact scenarios. A simple model is adopted to describe the basic characteristics of pressure distribution on the wall along the symmetry vortex ring plane at low Reynolds number.

Jing Lou
Institute of High Performance Computing

Date submitted: 06 Aug 2009

Electronic form version 1.4