

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Laser front distortions due to flow field around a helicopter configuration on hover and forward motion¹ SIMHA DODBELE, Naval Air Systems Command, Patuxent River, MD — Laser beam front distortions characterizing near field losses of energy from a turret mounted on a generic helicopter have been computed to support the modeling and simulation effort of a directed energy testing. The flow field has been computed using an unstructured computational fluid dynamics method with (a) Reynolds averaged Navier-Stokes method with Spalart-Almaras (SA) turbulence model and (b) time accurate Detached Eddy Simulation with SA turbulence model. The beam distortions have been computed using an aero-optics model developed at the University of Notre Dame. For study (a), the rotor surface is modeled by an actuator disk with a jump in the pressure at the disk plane with the laser passing through the flow field due to the fuselage and the rotor. In the case of study (b), the laser is passing through a time accurate flow field of an isolated rotor blade. The laser front distortions, computed through optical path differences for several azimuth and elevation angles for hover and forward flight conditions, are presented in this study.

¹Applied Aerodynamics Stores Separation Branch, NAVAIR, Patuxent River, MD.

Simha Dodbele
Naval Air Systems Command, Patuxent River, MD

Date submitted: 08 Aug 2009

Electronic form version 1.4