

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Flow Structures within a Helicopter Rotor Hub Wake BRIAN ELBING, Oklahoma State Univ, DAVID REICH, SVEN SCHMITZ, Pennsylvania State University — A scaled model of a notional helicopter rotor hub was tested in the 48" Garfield Thomas Water Tunnel at the Applied Research Laboratory Penn State. The measurement suite included total hub drag and wake velocity measurements (LDV, PIV, stereo-PIV) at three downstream locations. The main objective was to understand the spatiotemporal evolution of the unsteady wake between the rotor hub and the nominal location of the empennage (tail). Initial analysis of the data revealed prominent two- and four-per-revolution fluid structures linked to geometric hub features persisting into the wake far-field. In addition, a six-per-revolution fluid structure was observed in the far-field, which is unexpected due to the lack of any hub feature with the corresponding symmetry. This suggests a non-linear interaction is occurring within the wake to generate these structures. This presentation will provide an overview of the experimental data and analysis with particular emphasis on these six-per-revolution structures.

Brian Elbing
Oklahoma State Univ

Date submitted: 24 Jul 2015

Electronic form version 1.4