Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

New Vortex Shedding Criteria for Low Order Models of Unsteady Plate Motion FIELD MANAR, ANYA JONES, Univ of Maryland-College Park — A complex potential flow model with a small number of point vortices of time-varying strength is developed to evaluate the flow around an infinitely thin flat plate undergoing arbitrary unsteady motion. Vortex strengths are determined using the Kutta condition, and vortex convection takes place according to an impulse-matching scheme. Previous work has had only limited success due to vortices not being properly shed from the plate and acquiring too much circulation. In this work, a new vortex shedding criterion based on the dynamics of the shear layer is investigated. This criterion seeks to approximate the occurrence of vortex pinch off by observing the tangential velocities in the shear layer. The effect of the new vortex-shedding criteria on the evolution of the flow are evaluated with respect to previous shedding criteria and experimental PIV results. One motivation for the development of this model is to predict the unsteady forces on a wing quickly, and at low computational cost. Given the velocity field computed via the complex potential model, the forces on the plate are computed by taking the time derivative of the total flow momentum, and are evaluated with respect to experimental measurements.

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Date submitted: 31 Jul 2015 Electronic form version 1.4