

Abstract Submitted  
for the DFD08 Meeting of  
The American Physical Society

**Flapping wings: viscous effects in Lighthill–Weis-Fogh mechanism** DMITRY KOLOMENSKIY, M2P2 & CMI, Universite de Provence, Marseille, France, H. KEITH MOFFATT, DAMTP, Cambridge University, U.K., MARIE FARGE, LMD-CNRS, Ecole Normale Superieure, Paris, France, KAI SCHNEIDER, M2P2 & CMI, Universite de Provence, Marseille, France, M2P2 & CMI TEAM, DAMTP TEAM, LMD-CNRS TEAM — The Lighthill–Weis-Fogh “clap-fling-sweep” description of insect flight involves a novel mechanism, which can apparently operate in a strictly inviscid fluid, of generation of circulation and lift through instantaneous change of topology. However, viscous effects substantially influence this mechanism, both near the sharp edges of the wings by the well-known vortex-shedding process, and in the neighbourhood of the “hinge,” where the local Reynolds number is necessarily low. In this investigation, we focus on viscous effects at and around the instant of separation of the wings. The local flow near the hinge is described by similarity solutions of the Stokes (biharmonic) equation, and a logarithmic singularity of the pressure is identified. Numerical simulation of the process provides support for the analytical description.

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Date submitted: 01 Aug 2008

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