Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

The geometry and dynamics of interacting rigid bodies and point vortices JORIS VANKERSCHAVER, California Institute of Technology, EVA KANSO, University of Southern California, JERROLD MARSDEN, California Institute of Technology — We present some of our results on the geometry behind rigid bodies in perfect flows interacting with point vortices. We use symplectic reduction by stages to re-derive the equations of motion, and introduce a number of geometric structures along the way, most notably a special principal fiber bundle with connection, which encapsulates the response of the fluid to motions of the rigid body. As an aside, we show that a number of classical results, such as the expression for the Kutta-Joukowski force on a rigid body with circulation, or the form of the interaction between the vortices and the body, are consequences of the fact that the curvature of this connection is non-zero.

Joris Vankerschaver
California Institute of Technology

Date submitted: 01 Aug 2008 Electronic form version 1.4