1126-35-289 **Giusy Mazzone*** (giusy.mazzone@vanderbilt.edu), Department of Mathematics, 1326 Stevenson Center, Vanderbilt University, Nashville, TN 37240. *Long-time behavior of rigid bodies with a fluid-filled gap.*

We consider the system constituted by a rigid body $\mathcal{B}$ having a hollow cavity which (strictly) contains a homogeneous rigid ball B_R. The gap between these rigid bodies is completely filled by a viscous incompressible fluid, whose motion is governed by the Navier-Stokes equations. We assume that the whole system $\mathcal{S}$ of rigid bodies with a fluid-filled gap is constrained to move (without friction) around the center, G, of the ball B_R. For a large class of configurations for the fluid and the solid $\mathcal{B}$, we show that the long-time behavior of weak solutions corresponding to initial data having (arbitrary) finite kinetic energy is characterized by a steady state. In this steady state, $\mathcal{S}$ rotates as a whole rigid body with constant angular velocity. In particular, the velocities of the fluid relative to $\mathcal{B}$ and to B_R tend to zero as time approaches to infinity, respectively. (Received January 16, 2017)