Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

A numerical investigation of a simplified human birth model ROSEANNA GOSSMANN, Tulane University, ALEXA BAUMER, The George Washington University, LISA FAUCI, Tulane University, MEGAN C. LEFTWICH, The George Washington University — This work uses a simplified model to explore the forces experienced by the fetus during human birth. Numerical results are compared with the results of a physical model representing the fetus moving through the birth canal using a rigid cylinder (fetus) that moves at a constant velocity through the center of a passive elastic tube (birth canal). The entire system is immersed in a highly viscous fluid. Numerical simulations are run at low and zero Reynolds numbers. In each case, the pulling force necessary to move the rigid inner cylinder at a constant velocity through the tube is measured. The discrete elastic tube through which the rigid cylinder passes has macroscopic elasticity matched to the tube used in the physical experiment. The buckling behavior of the elastic tube is explored by varying velocity, length, and diameter of the rigid cylinder, and length of the elastic tube. More complex geometries as well as peristaltic activation of the elastic tube can be added to the model to provide more insight into the relationship between force and velocity during human birth.

Roseanna Gossmann
Tulane University

Date submitted: 01 Aug 2016 Electronic form version 1.4