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An experimental study of human birth models ALEXA BAUMER, The George Washington University, ROSEANNA GOSSMANN, LISA J FAUCI, Tulane University, MEGAN C. LEFTWICH, The George Washington University — The laboring uterus is a complex and dynamic fluid system. Relatively little is known about the fluid properties in this system. However, the two primary fluids of interest, amniotic fluid and vernix caseosa, likely play integral roles in the force transferred to the fetus during the final stages of parturition. This investigation probes the role of fluid in the force transfer during delivery by considering physical models that determine the role of various components of the full system. The first experimental model represents the fetus passing through the birth canal as concentric cylinders with a fluid filled gap. The rigid, inner cylinder moves through the highly flexible outer cylinder at a prescribed velocity. The geometry of the inner cylinder is varied by aspect ratio and length. A total of five different inner geometries are used to fully investigate the parameter space. As the inner cylinder moves through the outer cylinder, strain measurements are taken. These measurements are converted to force measurements as a function of time and position in the outer cylinder. The results of these experiments are compared with numerical results to form a more complete picture of force transfer. This model can be used as the foundation for predicting the force needed to deliver a fetus in the final stages of parturition. Additionally, more complex models, that incorporate uterine contraction forces, are being developed.

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