

Abstract Submitted
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Measuring the Effects of Sensitivity to Initial Rotational Conditions on Rigid Body Dynamics MADELINE CARTER, JOSEPH GUTHEINZ, JAMES CLARAGE, University of St. Thomas — Our experiment concerns the mathematical and experimental observation of a sensor-enabled parallelepipedal object in free-fall to test its sensitivity to initial rotation conditions. The independent variable manipulated in our process of experimentation was the axis along which the parallelepipedal object rotates, with the expectation that the intermediate or z axis (where the lengths of the object are: $x > z > y$) would produce greater sensitivity to initial conditions in accordance with the interpretation of the mathematics driving the expected motion of the object. To test the predictions of theory, an experiment was devised wherein we went to the top of our university science building and did controlled drops of a Pasco Smart Cart off of a sharp ledge along all three axes. This allowed the cart to experience free fall, drag force, and rotation along all three axes. The data were then parsed and modeled using code written in Mathematica allowing for quantitative analysis of the experimental results.

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