Could NASA Be Wrong? A Study of Model Rocketry Using the DIMU-method

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Since the breakthrough of modern rocketry in the 1930s, rocket research has been a multibillion business. For an individual it has been difficult, or impossible, to compete with or question the giants of the field, such as NASA, without corporative or institutional support or assistance. For instance, NASA has made claims about model rocketry when it comes to the aspects of stability and aerodynamic properties, which until today have been impossible to challenge without expensive equipment and professional tools. In this interdisciplinary study a new and low-cost method, the DIMU-method, has been developed and utilized to study the aerodynamic properties of model rocketry without corporative or institutional support. The study determines that the aerodynamic drag coefficient Cd of a stereotypical model rocket, which NASA claims to be Cd = 0.75, instead should be corrected to the value Cd = 0.33. The study also concludes that a guideline value of Cd for a streamlined designed model rocket Cd = 0.20. The DIMU-method is validated using a known reference object of a sphere. The study also concludes by analyzing the inflight oscillations with the DIMU that the optimal stability of a model rocket is achieved when the center of mass is placed at the largest possible distance in front of the center of pressure. By moving the center of mass from 24 mm to 98 mm in front of the center of pressure, the magnitudes of the mean oscillations decreases from 30.4° to 12.5°. The methodology developed in this study enables science and education of model rocketry and aerodynamics at a very low cost and on a non-institutional level.

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