Development of an aerodynamic free-fall apparatus for microgravity experiments

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Because it is difficult to control water in microgravity, experiments involving water are not generally performed aboard the International Space Station (ISS). In previous research, we designed a pipette which uses differences in surface wettability and should make experimenting with water much easier in microgravity. We have been performing experiments with a homemade, free-fall type apparatus. Within a 40 x 30 x 25cm box in free-fall, we have shown that water will rise in a glass tube and stop at the boundary between surfaces of differing wettabilities. These experiments have shown that the apparatus can effectively create microgravity conditions. The apparatus used in these experiments was a rectangular prism. Presently, we propose novel improvements to increase the stability of the gravitational environment within the capsule. To reduce air resistance, corners will be removed and conical panels will be attached to the upward and downward facing sides of the capsule.

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