Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Sedimentation of Triple Twisted Möbius Objects NICOLAS MORENO, DAVID VASQUES-CORTES, MICHAEL GRUNWALD, JOHANNES SCHOENKE, ELIOT FRIED, Okinawa Institute of Science and Technology — Screw-like objects like helix and Möbius strips exhibit both rotation and translation as they move in a fluid due to external forces such as gravity. It is expected that the orientation of the twist in the structure determines the direction of the rotational motion. Here, we conduct both computational and experimental studies on the sedimentation of rigid Möbius bands with a three-half twist. We vary the aspect ratio of the bands and analyze their trajectories. We use two different schemes to construct the bands corresponding ruled developable surfaces and ruled binormal-scroll surfaces. For developable bands, we observe that the spinning direction is consistently determined by the orientation of the band, independent of its aspect ratio. Remarkably, for binormal-scroll bands, the direction of spin depends not only on the twist orientation but also on aspect ratio. Experimentally, we track the sedimentation of 3D-printed polystyrene bands in water. Computationally, we use the particle-base method dissipative particle dynamics. The hydrodynamic properties of these objects offer exciting applications for mixing and separation in microfluidics and may also serve as prototypes for passive swimmers.

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Date submitted: 30 Jul 2019 Electronic form version 1.4