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Propulsion of micro-structures in Oscillatory Stokes Flow IKHEE JO, YANGYANG HUANG, Univ of Southern California, WALTER ZIMMERMAN, Universitat of Bayreuth, EVA KANSO, Univ of Southern California — Drug delivery often necessitates specific site-targeting within the human body. The use of micro and/or nano devices swimming through the bloodstream provides an attractive mechanism for targeted drug targeting, however the design and practical implementation of such devices remain very challenging. Inspired by flapping wings, we construct a two-dimensional wedge-like device, consisting of two links connected by a linear torsional spring and released in an oscillatory Stokes flow. We vary the stiffness and rest angle of the linear spring and the oscillation amplitude and frequency of the background flow to explore the behavior of the device. We find that the device achieves a net displacement, or propulsion, in oscillatory flows even when no elastic energy is stored initially, thus breaking Purcells scallop's theorem. More importantly, the vehicle tends to align with the background flow under perturbations. We conclude by commenting on how to control the parameters of the device and the fluid to achieve desired behavior of the device. These findings may have significant implications on the design of micro devices in viscous fluids.

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