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Self propulsion of bubbles in wedge-shaped geometries HOWARD STONE, Princeton University, THIBAULT SCOARNEC, ANN LAI, MATHILDE REYSSAT, Harvard University — Self propulsion of bubbles and drops can be created by geometrically forcing capillary pressure gradients. We investigated such self propulsion experimentally by confining long bubbles in flat wedge-shaped geometries that have rectangular cross sections and are closed at both ends. The bubble moves from the narrow end toward the wider end with a speed that monotonically decreases in time. The fluid motion past the bubble occurs through the corners between the bubble and walls of the rectangular cross-section, so that the fluid flow is fully three dimensional. In order to quantitatively describe the motion of the bubble we introduce a one-dimensional model in the spirit of lubrication theory. The predictions of the model are in very good agreement with the experimental measurements and capture the variations with bubble size, wedge angle, and viscosity of the continuous phase.

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