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**Buckling shells are also swimmers**[1] CATHERINE QUILLIET, LIPhy, Universit Grenoble Alpes CNRS, DYFCOM BUBBLEBOOST TEAM[2] —
We present an experimental and numerical study on the displacement of shells undergoing deformations in a fluid. When submitted to cycles of pressure difference between outside and inside, a shell buckles and debuckles, showing a succession of shapes and a dynamics that are different during the two phases. Hence such objects are likely to swim, including at low Reynolds (microscopic scale). We studied the swimming of buckling/debuckling shells at macroscopic scale using different approaches (force quantization, shape recording, displacement along a frictionless rail, study of external flow using PIV), and showed that inertia plays a role in propulsion, even in situations where dimensionless numbers correspond also to microswimmers in water. Different fluid viscosities were explored, showing an optimum for the displacement. Interestingly, the most favorable cases lead to displacements in the same direction and sense during both motor stroke (buckling phase) and recovery stroke (de-buckling phase). This work opens the route for the synthesis with high throughput of abusively simple synthetic swimmers, possibly gathered into nanorobots, actuated by a scalar field such as the pressure in echographic devices.

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