

Dual modulus actuators for snap-through instability

Duygu Sezen Polat, Dirk Jan Mulder, Dirk J. Broer and Danqing Liu



Introduction

Design paradigms that enable the fast and rapid responses can unlock the true potential of soft-materials as they suffer from slow responses and small forces. Nature is a great source of inspiration where its elegant machineries can put instabilities into work to respond in a rapid manner. Venus flytrap, for example, can close its leaves to catch a prey in less than 100 milliseconds by employing snap-through instability.

Project summary

We have previously demonstrated the potential of snap-through instability in liquid crystalline networks (LCNs) with snappers that can actuate in less than 70 milliseconds, propel big and small objects from its surface (Figure 1). In this work we aim to intensify the performance of snap-through by developing dual modulus actuators. The first step is going to be the development of chemistry and fabrication of the LCNs with dual modulus, after which its integration into a device can follow.



Figure 1: Snap-through of LCN. Snapper is 1 mg, ball is 2 mg and scale bar corresponds to 2 mm.

Project goals

I am looking for motivated students to help me with the fabrication of dual modulus actuators. Work is going to include the optimization of the fabrication procedure and characterization of the actuators.

Contact information

If you have questions and would like to learn more about the project, feel free to contact me: d.s.polat@tue.nl