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Experiments and analysis of viscous flows in bistable elastic channels OFEK PERETZ, Faculty of Mechanical Engineering, Technion - Israel Institute of Technology, ANAND MISHRA, ROBERT SHEPHERD, Organic Robotics Laboratory, Cornell University, Ithaca, New York, AMIR D. GAT, Faculty of Mechanical Engineering, Technion - Israel Institute of Technology, . COLLABORATION — We present experimental results of viscous fluid propagating into a slender channel with bi-stable cross-section shape, emanating from an upper surface which is a compressed curved elastic sheet. During the propagation of the liquid into the channel, the surface snaps from one stable shape to the other, and a moving front is observed. This front includes wrinkling of the elastic surface, and is shown to provide a stable transition between the two stable shapes of the channel. The viscous flow is analyzed via applying the lubrication approximation and examining self-similarity. For the case of constant inlet pressure, the propagation rate of the transition region is presented for various physical limits. Good agreement is obtained between the experiments and analysis.

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