

Tensile states for thin electro-active actuators

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Abstract

The onset of compression induces wrinkling in actuation devices based on EAPs (Electro Active Polimers) thin films, which leads to a sudden decrease of performances up to failure. In this work we systematically analyze, inspired by the classical tension field theory for thin elastic membranes, the dependence of this type of instability on the constitutive properties of the elastomer.. Specifically, we show how to deduce, in the membrane stretches space, a voltage dependent region of tensile states. Interestingly the geometrical qualities of this region (such as boundedness, convexity) play an important role in the responses of the electromechanical activation device. The obtained results give a direct and simple tool in the perspective of EAPs material design.