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Inhomogeneous deformation and instability in soft dielectric transducers TIEFENG LI, SHAOXING QU, Zhejiang University, CHRISTOPH KEPLINGER, Johannes Kepler University, ZHIGANG SUO, Harvard University, WEI YANG, Zhejiang University — Dielectric elastomer (DE) is assembled by sandwich an elastomeric membrane with compliant electrodes on both sides. They are capable of converting mechanical into electrical energy (generator) or electrical into mechanical energy (actuator). The large actuation strain of DE has inspired intense development of dielectric elastomers as applications as actuators and generators. DE transducers are lightweight, compliant, rust-free, and can convert higher energy than those of conventional transducers. DE transducers often undergo inhomogeneous deformation and instability during operation. Inhomogeneous deformation can cause the DE membranes to have inhomogeneous fields distribution and fail locally. Instability during actuation highly affects the performance and safety of the DE transducer. We present an analytical model of a dielectric elastomer transducer undergoing inhomogeneous deformation and snap-through instability during operation.

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