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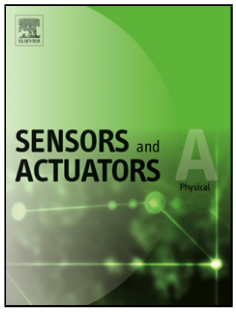

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PII: S0924-4247(14)00450-6
DOI: http://dx.doi.org/doi:10.1016/j.sna.2014.10.016
Reference: SNA 8933

To appear in: *Sensors and Actuators A*

Received date: 30-4-2014
Revised date: 14-10-2014
Accepted date: 14-10-2014

Please cite this article as: Lior Medina, Rivka Gilat, Bojan Ilic, Slava Krylov, Experimental investigation of the snap-through buckling of electrostatically actuated initially curved pre-stressed micro beams, *Sensors & Actuators: A. Physical* (2014), http://dx.doi.org/10.1016/j.sna.2014.10.016

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Experimental investigation of the snap-through buckling of electrostatically actuated initially curved pre-stressed micro beams

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Abstract

The experimental study of the stability properties of initially curved micro beams subjected to an axial pre-stressing load and transversal deflection-dependent distributed electrostatic force is presented. The devices were fabricated from single crystal silicon on insulator (SOI) wafer using deep reactive ion etching (DRIE). The in-plane quasi-static beam response was video recorded and analyzed by means of image processing. The beam behavior was theoretically predicted using a reduced order model with the axial pre-stressing force assessed on the basis of the deviation of the beam actual initial curvature from the nominal designed one. The experimental results are consistent with the theoretical symmetric and asymmetric snap-through buckling criteria.

Keywords:
Curved micro beam, Axial pre-stress, Electrostatic actuation, Bistability, Snap-through buckling, Pull-in, MEMS/NEMS, Buckling criteria, Buckling experiments

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