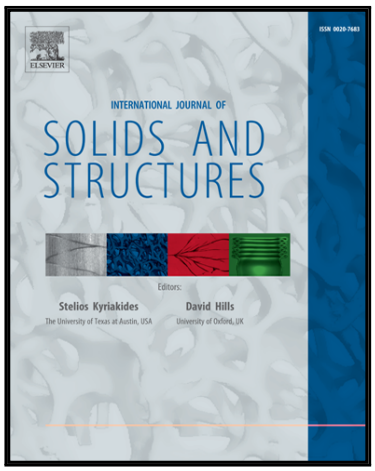

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Snap-through of shallow reticulated domes under unilateral displacement control

Raymond H. Plaut*

Department of Civil and Environmental Engineering, Virginia Tech, Blacksburg, VA 24061, USA

ABSTRACT

Snap-through instability of shallow reticulated (lattice) domes subjected to a quasi-static downward displacement or force at a joint is analyzed. For the case of unilateral displacement control, the joint is pushed downward by an indentor until it snaps (jumps) to another equilibrium configuration, and then pushed further until another snap occurs, and so on. Under force control, the magnitude of the force is increased, and a different sequence of snaps (local and then global) is exhibited. Green-Lagrange strain is assumed, as well as engineering strain for the smaller dome. The equilibrium equations are solved numerically using Mathematica. For force control, snaps may occur on the equilibrium path (force versus displacement at the force) at limit (maximum) points and at bifurcation points. For unilateral displacement control, snaps may occur at points where the associated downward force decreases to zero, at turning points (which have a vertical tangent), and at bifurcation points (if the bifurcating path moves downward at the loaded joint).

Keywords: Reticulated domes; Lattice domes; Snap-through; Displacement control; Force control

* Tel.: +1 540 552 0111; fax: +1 540 231 7532

E-mail address: rplaut@vt.edu