Broadening global families of anti-plane shear equilibria

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Abstract

In this talk, we will discuss some recent global bifurcation results in nonlinear elastostatics. Specifically, we consider anti-plane shear deformations for several classes of materials. In one case, we show that a broadening phenomena occurs. Roughly speaking, this corresponds very wide and flat equilibria solutions in the global continuum. Broadening has been predicted numerically for internal solitary water waves, yet no rigorous construction of such waves exists. Our result seems to be the first to show broadening in the PDE context. Another class of materials is shown to suffer a breakdown of ellipticity in the limit. This behavior has been linked to failure mechanics for nonlinear elastic materials.