

Tarantino, Angelo Marcello

On extreme thinning at the notch tip of a neo-Hookean sheet. (English) Zbl 0909.73015
Q. J. Mech. Appl. Math. 51, No. 2, 179-190 (1998).

Summary: We investigate the deformation and stress fields around the apex of a notch (in an infinite, thin and incompressible sheet of neo-Hookean material). General far-field loading and conditions ensuring vanishing tractions at the notch faces are considered. For certain notch angles, the sheet can exhibit a singular asymptotic behaviour, characterized by unbounded in-plane stresses, accompanied by transversal extreme thinning. The problem, which is formulated within the nonlinear elastoplastic plane stress theory, is governed by a quasilinear system of two partial differential equations of the second order with respect to the two in-plane components of the unknown deformation. An asymptotic analysis is performed to extract a solution from such a system. As the notch angle varies, emphasis is placed on the degree of singularity of the Cauchy stress fields as well as on the behaviour of the transverse stretch at the apex.

MSC:

74B20 Nonlinear elasticity

Cited in **6** Documents

Keywords:

transverse stretch at apex; far-field loading; singular asymptotic behaviour; nonlinear elastoplastic plane stress theory; degree of singularity; Cauchy stress fields

Full Text: [DOI](#)