

## Self Similar Dynamic Expansion of a Spherical Cavity in Elastoplastic Media

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SELF SIMILAR DYNAMIC EXPANSION OF A SPHERICAL CAVITY IN ELASTOPLASTIC MEDIA Rami Masri and David Urban Faculty of Aerospace Engineering, Technion-Israel Institute of Technology, Haifa 32000, Israel  
Brief Abstract The self-similar field induced by dynamic expansion of a pressurized spherical cavity is investigated for elastoplastic solids. Material behavior is described by the hypoelastic model of the non associated Drucker-Prager material with arbitrary strain-hardening. We examine in detail the external elastic field, which is expected to develop at a distance from the cavity prior to plastic yielding. A new observation that emerges from the elastic solution is the possible existence of a compressive elastic zone where yielding is prevented since the effective stress remains negative. Simple analytical solutions are given for fully incompressible elastic/perfectly-plastic material with a non-associated flow rule. In particular, we study the influence of plastic pressure sensitivity on the dynamic cavitation pressure. A few useful relations are derived for the cavitation pressure, which reveal the coupled effect of plastic pressure sensitivity and material inertia. Several numerical illustrations are presented for the solid with an associated flow rule along with a plastic boundary layer analysis for the thin singular zone near the cavity wall. An elegant expansion, in powers of Mach number, is derived for the cavitation pressure in a Mises medium

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