Effects of anisotropy and void shape on cavitation instabilities

The influence of plastic anisotropy on cavitation instabilities is studied by analyzing full three dimensional cell models containing a small void. The anisotropic material is represented by an elastic-viscoplastic material with a small rate hardening exponent, and different 3D stress states are considered in the range of high stress triaxialities where the occurrence of cavitation instabilities can be expected. For isotropic plasticity the final shape of the growing voids is close to spherical, whether or not the initial shape was spherical. But for anisotropic materials the final void shape develops towards a spheroidal shape, which is characteristic for the anisotropy considered. This is studied both for initially spherical voids and for initially spheroidal voids. The critical stress levels found depend much on the anisotropy, but shows little influence of the initial void shape considered.

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