

Residual Stresses in Nonlinear Strain Hardening Annular Disks of Variable Thickness Subject to External Pressure

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A computational model is developed to estimate the residual stresses in nonlinearly hardening variable thickness annular disks under external pressure. The model is based on von Mises' yield criterion, deformation theory of plasticity and a Swift-type hardening law. A thickness profile in the form of a general parabolic function is considered. The residual stresses occurring in annular disks upon complete unloading of external pressure are determined and the possibility of occurrence of secondary plastic flow is investigated. It is shown that, depending on both the aspect ratio and the thickness variability, different plastic flow regimes may occur in such disks and secondary plastic flow does not occur during elastic-plastic stress states.

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