# Plastic Bifurcation Buckling of Elliptical Sandwich Plates

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## ABSTRACT

Bifurcation buckling of elliptical sandwich plates subjected to uniform compression is investigated. The state of stress in faces is allowed to be in the plastic range as defined by the Mises yield criterion and isotropic strain hardening. Also, Shanley's concept of plastic bifurcation under increasing loading is adopted.

The kinematic assumptions used in the analysis allow inclusion of the effects of transverse shear strains. The form of the employed constitutive relations is general enough to include the incremental and deformation theories of plasticity, as well as the elastic theory.

The analysis is exact, and generalizes the classical results for elastic buckling of thin elliptical plates without shear effects. As special cases, buckling pressures and the associated mode shapes are obtained for elastic and plastic buckling of homogeneous (one material) as well as sandwich (two materials) plates. Results for rectangular and circular sandwich plates under uniform compression are obtained as limiting cases of the elliptical plates. They are compared with the previous results for these individual cases worked out by the author.

Numerical results are presented for elliptical plates with aluminum alloy faces and a low-modulus elastic core. Comparison is made of the buckling loads obtained on the basis of the incremental theory versus those from the deformation theory of plasticity.