# Preliminary Analytical Solution of Large Deflection of Clamped Orthotropic Circular Plate under Initial Tension

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## Abstract

The linear version problem of large deflection of a clamped orthotropic circular plate under initial tension and uniform lateral pressure is solved. The non-dimensional governing equations based on Von Karman plate Theory for large deflection are developed first followed by neglecting the arising nonlinear term. The approach utilizes the definition of modified Bessel Functions and the associated recurrence relations and formulas for derivatives. The non-dimensional slopes and deflections are then obtained for a given transverse load and in-plane tension. Emphasis is placed on the investigation of the effects of material orthotropy upon the transition behavior between a plate and a membrane and the characteristics of the edge zone near the boundary of the plate. Parametric studies including the effects of geometry and the magnitude of the pretension, for typical silicon- based members, were conducted as well.

Keyword：large deflection, Cylindrical orthotropic plate, initial tension