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Generalized Equilibrium Equations for Shell Derived from a Generalized Variational Principle

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Abstract

In this paper, the general equations of equilibrium for axisymmetrical deformation including the torsional deformation of shells with general forms are derived as stationary conditions of a generalized variational principle, which is established by the semi-inverse method. It shows that they are different from the results obtained by Chien (*Applied Mathematics & Mechanics*, 11(5), 1990, 403-412) in case of revolutionary shell, therefore Chien's results can be further improved.

Keywords: Variational theory, shell, elasticity, semi-inverse method

1. Introduction

In 1990, Chien[1] studied torsional rigidity of shell of revolution, and derived the general equations of equilibrium for axisymmetrical deformation including the torsional deformation of revolutionary shell from a constrained variational principle. By a careful inspection, we found that Chien's results could be further improved.

In this paper, we will use the semi-inverse method[2,3,4] to establish a generalized variational principle for thin shells with general forms, and the equilibrium equations can be readily obtained from the obtained variational principle. In case of shell of rotation, we

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