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Simply Supported Polygon Plate Frequencies using Classical and Shear Deformation Theories

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Abstract

In this paper, the frequency equation relationship between classical plate theory and a third order single variable plate theory is derived. The third order single variable plate theory used herein is considerably simpler in the class of higher order plate theories. The theory uses a single variable to formulate the plates. The theory is governed by only one differential equation. As the formulation involves a single unknown function, plate analysis using this theory goes almost in the similar lines of classical plate theory. Hence, the complexity associated with plate analysis is considerably less compared to other higher order plate theories. This paper focuses on obtaining the frequency equation relationship between the third order single variable plate theory used herein and the classical plate theory. The relationships between the third order plate theory and

classical plate theory frequency equations are derived. Using the derived equations, the frequencies have been calculated for the case of regular polygon plates with simply supported edge conditions. Frequencies calculated herein are compared with other shear deformation plate theory frequencies. The obtained plate frequency results are in good agreement and are accurate.

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Section

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