Refined Dynamic Theory of Thick Plates In Extension-Bending and Its New Formulism

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Abstract

This research obtains refined equations of elastodynamics of the thick plate including the effect of the transverse loading by using appropriate gauge conditions. The proposed theory based on the theory of elastodynamics, applied the general solution proposed by Boussinesq-Galerkin and the operator theory of partial differential equations. The imaginary differential operator was firstly introduced in order to apply the spectrum decomposition theory of differential operators. The refined dynamic equations of plate bending and stretching were given, respectively. And the refined dynamic theory of thick plates was compared with the different classical theory of plates. Since derivation of the dynamic equation was conducted without any a priory assumptions, so the proposed dynamic equation of plates is exact, the governing equation proposed by this paper can be used to analyze vibration of thick plates, to evaluate the applicable condition of the engineering plate theory and exactly to design the active vibration control of thick plates.