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Flutter of thermally buckled angle-ply laminates with variable fibre spacing

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Abstract

This study presents the first aerothermoelastic analysis of angle-ply laminates with variable fibre spacing. Based on the Von Karman large deflection assumptions and quasi-steady supersonic aerodynamic theory, the effects of fibre distribution and temperature gradient on the thermal postbuckling, vibration, and flutter behaviors of angle-ply laminates subjected to aerodynamic force and thermal stress are discussed using the finite element method. The numerical results reveal that fibre redistribution can efficiently increase the critical buckling temperature, natural frequencies and flutter boundary. A new boundary along which the eigenvalue drops to zero is observed, and the chaotic phenomenon is eased due to temperature gradient.

Keywords: Variable fibre spacing; Angle-ply; Thermal postbuckling; Vibration; Flutter

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