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# Analytical Solution of Bending of a Clamped Elliptical Plate Under Lateral Load and In-Plane Force

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On the basis of the ordinary thin plate theory, the exact analysis on the bending problem of a clamped elliptical plate is performed by means of introducing the elliptical cylinder coordinates. The elliptical plate is subjected to the uniform lateral load and in-plane force simultaneously. The analytical solution for the deflection due to bending is obtained in the form of an infinite series of Mathieu functions and the coefficients of the series involve the circular, hyperbolic and modified Mathieu functions. The expressions for the bending moments are also derived analytically. It should be noted that the orthogonality of Mathieu functions is used in the process of leading to the expressions for the deflection and moments. Numerical calculation results for the dimensionless deflections and moments will be presented in figures for various values of in-plane force and axial-length ratio. The special case of circular plate will be also discussed in detail

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