

Stress analysis for thick rectangular plates

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Abstract: The governing equations, previously developed for plate bending and inplane stretching [1], are solved for the average displacements, w_c, u_c, v_c , and average rotations ϕ_x, ϕ_y . This involved the solution of the governing equations for the inplane problem, which has not been accomplished in previous refined theories. Explicit expressions for inplane stresses σ_x, σ_y , and τ_{xy} were found. The coupling of the bending problem and the inplane problem is manifested through the expressions derived from the inplane stresses. Also expressions for the resultant shear forces Q_x, Q_y ; resultant couples M_x, M_y, M_{xy} ; and resultant inplane forces N_x, N_y , and N_{xy} are found. III-conditioning problems that appear in a previous companion refined theory [2] were overcome in this present work. Results are compared with those as obtained from other refined theories.