

NUMERICAL SHAKEDOWN ANALYSIS OF CIRCULAR PLATES SUBJECTED TO CYCLES OF PRESSURE AND TEMPERATURE

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SUMMARY

Behavior of structures under combined action of loading and heating cycles is studied. Numerical methods are applied to determine the zone of elastic response after plastic prestrain. The zone is bounded on the plane of pressure p and temperature T by a line of modified elastic capacity. Plastic strains are computed first for a given loading program (control cycle). Boundary of the elastic domain is computed further by the method of directional search. Loading cycles within the domain produce elastic response only at any loading path.

Equations of large deflections of thin plates are applied. Variation of the yield locus and of the strain hardening modulus with temperature is accounted for. Incremental form of the plastic flow theory is used.

A method of direct numerical integration is used at fixed values of p and T . Boundary conditions are met applying the appropriately modified Newton-Raphson procedure.

The developed algorithm is applied in numerical examples concerning circular and annular plates.

