



Buckling and Postbuckling Behaviour of Cylindrical Shells under Combined External Pressure and Axial Compression

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ABSTRACT

Buckling and postbuckling behaviour of perfect and imperfect cylindrical shells of finite length subject to combined loading of external pressure and axial compression are considered. Based on the boundary layer theory which includes the edge effect in the buckling of shells, a theoretical analysis for the buckling and postbuckling of circular cylindrical shells under combined loading is presented using a singular perturbation technique. Some interaction curves for perfect and imperfect cylindrical shells are given. The analytical results obtained are compared with some experimental data in detail, and it is shown that both agree well. The effects of initial imperfection on the interactive buckling load and postbuckling behaviour of cylindrical shells have also been discussed.

NOTATION

R, L, t	Radius, length and thickness of cylindrical shell, respectively
Z	Batdorf's parameter, defined by $Z = (1 - \nu^2)^{1/2} L^2 / Rt$
β	Non-dimensional parameter, defined by $\beta = L / \pi R$
D, E, ν	Flexural rigidity, Young's modulus and Poisson's ratio of shell
P, q	Axial compressive load and lateral pressure
P_{cl}, q_{cl}	Classical buckling value of P and q