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On Non-Axisymmetric Collapse of Thin Tubes

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Thin walled tubes of different diameter to thickness ratios and made of aluminium and mild steel were subjected to axial compression tests in both annealed and as received conditions. The occurrence of non-axi-symmetric deformation mode shapes have been studied as a function of tube diameter to thickness ratio, annealing process, variation in tube wall thickness over the circumference, eccentricity in the shape, and boundary conditions. Cut outs in the form of circular holes were laterally drilled in some of the tubes and their influence on the mode of collapse is discussed. Influence of imperfections in tube thickness, shape, and boundary conditions on the occurrence of diamond mode of collapse is studied with the help of FE simulation. The results thus obtained compare well with the experiments. It is seen that the combined effect of thickness eccentricity and unsymmetrical in plane tube end conditions contributes significantly to the tube collapse in diamond mode.

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