THE BEHAVIOUR OF INTERSECTIONS IN CYLINDRICAL PRESSURE VESSELS

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Abstract

The thesis discusses the effects of internal pressure loading on flush intersections of cylindrical branches with cylindrical pressure vessels, when a branch is either radial or skew to the vessel.

The major investigation is experimental, and employs a new technique, that small scale rubber models are used for elastic tests. Accurate models were made quickly and cheaply out of silicone rubber. These models were ideal for both qualitative and quantitative study, and a large range of geometries was tested for a varying skew angle of the branch. From the results of these, test reported for twenty-four models unreinforced at the intersection, a detailed description is presented on the behaviour of the intersection for radial branches, and the changes in this pattern are described as the skew angle changes. Where comparisons are possible, results from this technique are shown to agree well with those from conventional methods.

The plastic behaviour of intersections in cylindrical pressure vessels is investigated using the method of upper-bound limit analysis. Solutions are presented for elliptical holes and radial branches in cylindrical and spherical vessels. The outcome is an upper bound on the limit pressure for any oblique intersection.