

ON THE DESIGN OF INTERSECTIONS IN PRESSURE VESSELS

I.W. Goodall

Abstract

A theoretical and experimental study of the behaviour of cylindrical and spherical pressure vessels with radial nozzles under internal pressure loading is presented.

In Part I the spherical intersection problem are considered. Both rigid-plastic and elastic-plastic large-deformation theories are presented and found to be consistent with each other and with experiment. A simple description of the post yield behaviour emerges that is applicable to most practically occurring geometries.

Part II the cylindrical intersection problem is considered. Because an elastic-plastic analysis is very complicated, the theoretical approach has been based on simple rigid-plastic ideas. The experimental work that has been performed indicates that design on the basis of a limit pressure is appropriate for this type of intersection. Comparison between experiment and theory shows that the theoretical solutions can be safely used in designs where limit pressure concepts are valid (i.e. situations in which fatigue and brittle fracture are not important).