THE INFLUENCE OF TEMPERATURE AND INTERNAL PRESSURE ON STRESSES IN PIPING SYSTEMS

W. Gorczynski

Abstract

The dissertation is concerned with the problem of estimating reaction and stresses in piping systems subjected to high temperature and static internal pressure. The aim throughout is the development of simple methods which are sufficiently accurate for use in actual design.

It is indicated how the behaviour is piping members, such as bends, can be affected by the internal pressure. In view of lack of an analysis for predicting the behaviour of single mire-bend subjected to thermal and pressure loading, an experimental method for determining the behaviour of such a member is described.

Current methods, used for the determination of reactions in piping systems, are summarised and their disadvantages are discussed. A method, suitable for analysing the models and prototypes, is developed and applied in a series of tests conducted on the models to which the displacements, opposite in direction but equal in magnitude to the thermal expansion, are imposed by means of a device developed by the author. A comparison of the experimental and calculated results is made and the time requirements for analysing a particular system by means of the two methods are discussed.

A method of analysing uniplanar systems, with two points of fixation but without the curved members, is advanced. This method, which is only approximate, is considered to be capable of predicting the flexural behaviour of pipework operating under steady creep.