PRACTICAL APPLICATIONS OF FINITE ELEMENT METHODS IN THE STRESS ANALYSIS OF THIN SHELL PRESSURE VESSELS

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Finite element methods are used to calculate the static elastic response of a thin shell under pressure and temperature loading. The shell structure under investigation is the AGR gas baffle designed for the Hinkley Point "B" and Hunterston "B" Power Stations. The prime function of the gas baffle is to separate the coolant gas flow in the reactor circuit and is essentially a thin shell of revolution. However, numerous structural discontinuities in the shell, e.g. large penetrations and local attachments produce a truly three dimensional thin shell structure with some three dimensional solid features.

Stress analysis of the shell has been carried out using relatively primitive finite elements and the results are presented in the paper. Commercially available special purpose programs "SAFE SHELL" and "FESS SHELL AND 3-D FRAME" have been used as well as a general purpose program "ELFIN" which is being developed by the authors company.

The paper emphasises the idealization of structures, perhaps the most important stage of any engineering analysis, and gives guidance for the practical application of finite element analysis of thin shells.