NONUNIFORM SHELL/FLOW VIBRATION ANALYSIS FOR A NUCLEAR PLANT

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ABSTRACT

In this study a hybrid finite element method is applied to investigate the vibration and stability of a clamped-clamped cylindrical shell subjected to flowing fluid (considering the flow to be uniform and then cross-sectionally nonuniform). The structural model is based on a combination of thin shell theory and the classical finite element method. The method is basically a hybrid finite element technique in which the shell is subdivided into cylindrical elements. The displacement functions of an element are determined by exact solution of the equations of static equilibrium of a thin cylindrical shell (Sanders' shell theory) instead of the usual and more arbitrary interpolating polynomials. This proposed hybrid finite element method is very powerful for predicting a loss of stability by buckling and for analyzing the dynamic behavior of different structures at a lower computational cost than other methods.