

# **ANALYSIS AND DESIGN OF PLATE AND SHELL STRUCTURES WITH FINITE ELEMENTS**

**G.A. Mohr**

## **Abstract**

The main emphasis in this work is upon the development and application of simple finite displacement element solutions with particular reference to design oriented problems in slabs and shells.

In the work of element development a new approach to bending elements is employed and this is also recommended for future work. Several other new elements, as well as variations in the derivation and working of many established elements, are also presented.

An attempt is also made to extend the present understanding of the convergence behaviour of displacement elements and a simple modification of the Southwell Plot is suggested for extrapolating monotonically convergent solutions.

An iterative procedure for the uniform strength design of slabs is developed and much used, showing consistent agreement with the fibre optimum theory developed by Lowe and Melchers, and further more detailed work is worthwhile in this area.

For the design of shells an iterative optimality criterion approach is developed and used to yield a new and apparently feasible solution for the design of an arch dam. Finally, however, it is an improved method that is recommended for future work in this area.

Finally, a number of other slab and shell problems are investigated leading to recommendations for future work upon structural shell analysis, incipient buckling problems and composite constructional systems.