The finite strip method in the analysis of elastic plates with two opposite simply supported ends

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I wish to congratulate the Author for presenting and popularizing the new version of finite element method. It perhaps appears to be useful for smaller computers. However, the method is limited to simple structures as the variation of stress or deformations assumed along any direction limits its application to particular support conditions and any variation of thicknesses cannot be considered.

20. A similar paper by Chakravarti[5] presents the analysis of thin elastic cylindrical shells simply supported at both ends and subjected to any loading for any arbitrary shape of directrix and any variation of thickness along the cross section. The calculations were carried out using a small computer, namely IBM 1620.

21. Both these applications are of great value but the basic advantage of using finite element method to analyse any type of structure under any support conditions like point supports, any variation of thickness and any loading has been completely lost.

22. A similar approach was presented by Pian[6] in which the stress distribution was prescribed.

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The Author is very much aware of the fact that the finite element method is the most versatile and general tool for the analysis of complete structures, and agrees with Mr Nayak on this point. However, this does not preclude us from using special methods which, although having more limited applications, possess certain other advantages.

24. The method is completely suitable for the analysis of orthotropic right bridge decks, which are often used in practice.[7] The method has been extended to deal with problems having other boundary conditions such as two ends clamped, one end clamped and one end simply supported, using one computer program. Thus the scope of application is now much wider.[8]

25. The Author would like to thank Mr Nayak for drawing his attention to Mr Chakravarti's paper. It should be pointed out that the approach adopted by Mr Chakravarti is essentially the same as the one adopted by Popov *et al.*[9] for the formulation of the conical element, and is not a direct stiffness method. That such an approach gives inferior results has been discussed in detail by Jones and Strome.[10]

References

5. CHAKRAVARTI S. Analysis of thin elastic cylindrical shells by finite element method. *J. Instn Engrs India*, 1967, **47** (Jan.) 380–403.
6. PIAN T. H. H. Element stiffness matrices for compatibility and prescribed boundary stresses. *Proceedings of conference on matrix methods in structural mechanics*. AFIT Wright–Patterson, Ohio, 1965, 457–478.
7. CHEUNG Y. K. Analysis of right bridge decks. *To be published.*

Paper published: *Proc. Instn civ. Engrs*, 1968, **40** (May) 1–7.

8. CHEUNG Y. K. Analysis of rectangular slabs by finite strip method. *J. Engng Mech. Div. Proc. Am. Soc. civ. Engrs*, 1968 (Dec.).
9. POPOV E. P. *et al.* Finite element solution for axisymmetric shells. *J. Engng Mech. Div. Proc. Am. Soc. civ. Engrs*, 1964 (Oct.) 119–145.
10. JONES R. E. and STROME D. R. A survey of analysis of shells by the displacement method. *Proceedings of a Conference on matrix methods in structural mechanics*. Air Force Institute of Technology, Ohio, October 1965.