Development of Finite Elements for Two-Dimensional Structural Analysis Using the Integrated Force Method (Paperback)

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Development of Finite Elements for Two-Dimensional
Structural Analysis Using the Integrated Force Method

Kaljevic, Igor and Patnaik, Surya N. and Hopkins, Dale A.

Glenn Research Center

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Reviews

It is really an remarkable book which i have ever go through. It can be writter in simple terms and not difficult to understand. I am just effortlessly can get a enjoyment of reading a composed pdf.
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DEVELOPMENT OF FINITE ELEMENTS FOR TWO-DIMENSIONAL STRUCTURAL ANALYSIS USING THE INTEGRATED FORCE METHOD (PAPERBACK)

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Independently Published, United States, 2018. Paperback. Condition: New. Language: English. Brand new Book. The Integrated Force Method has been developed in recent years for the analysis of structural mechanics problems. This method treats all independent internal forces as unknown variables that can be calculated by simultaneously imposing equations of equilibrium and compatibility conditions. In this paper a finite element library for analyzing two-dimensional problems by the Integrated Force Method is presented. Triangular- and quadrilateral-shaped elements capable of modeling arbitrary domain configurations are presented. The element equilibrium and flexibility matrices are derived by discretizing the expressions for potential and complementary energies, respectively. The displacement and stress fields within the finite elements are independently approximated. The displacement field is interpolated as it is in the standard displacement method, and the stress field is approximated by using complete polynomials of the correct order. A procedure that uses the definitions of stress components in terms of an Airy stress function is developed to derive the stress interpolation polynomials. Such derived stress fields identically satisfy the equations of equilibrium. Moreover, the resulting element matrices are insensitive to the orientation of local coordinate systems. A method is devised to calculate the number of rigid body modes, and the present elements are shown to be free of spurious zero-energy modes. A number of example problems are solved by using the present library, and the results are compared with corresponding analytical solutions and with results from the standard displacement finite element method. The Integrated Force Method not only gives results that agree well with analytical and displacement method results but also outperforms the displacement method in stress calculations. Kaljevic, Igor and Patnaik, Surya N. and Hopkins, Dale A. Glenn Research Center NASA-TM-4655, E-9240, NAS 1.15:4655 RTOP 505-63-53.

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