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A robust triangular plate bending element of the Reissner-Mindlin type. (English)

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Summary: A new triangular plate element is presented. This new element is based on independent interpolations for slopes, displacement and shear forces, and it is shown that it does not suffer from any defect common to other Mindlin plate elements. Several examples are presented to illustrate the behaviour of this new element.

MSC:

74S05 Finite element methods applied to problems in solid mechanics

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Keywords:

mixed formulation; robust element; stability; new triangular plate element; independent interpolations; slopes; displacement; shear forces

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References:

- [1] and , 'Curved thick shell and membrane elements with particular reference to axi-symmetric problems', Proc. 2nd Conf. on Matrix Methods in Structural Mechanics, Wright-Patterson Air Force Base, Ohio, 1968.
- [2] 'Curved finite elements in the analysis of solid shell and plate structures', Ph.D. Thesis, University of Wales, Swansea, 1969.
- [3] Zienkiewicz, Int. j. numer. methods eng. 3 pp 275- (1971)
- [4] Pawsey, Int. j. numer. methods eng. 3 pp 575- (1971)
- [5] Pugh, Int. j. numer. methods eng. 12 pp 1059- (1978)
- [6] and , 'A study of locking phenomena in isoparametric elements', in (ed), Mathematics of Finite Elements and Applications, MAFELAP 1978, Academic Press, London, 1979, pp. 437-447
- [7] Reissner, J. Appl. Mech. 12 pp 69- (1945)
- [8] Mindlin, J. Appl. Mech. 18 pp 31- (1951)
- [9] Malkus, Comp. Methods Appl. Mech. Eng. 15 pp 63- (1978)
- [10] Hughes, Comp. Struct. 9 pp 445- (1978)
- [11] Hughes, Nucl. Eng. Des 46 pp 203- (1978)
- [12] Lee, Int. j. numer. methods eng. 18 pp 1297- (1982)
- [13] Cook, Int. j. numer. methods eng. 4 pp 141- (1972)
- [14] and , 'Some quadrilateral isoparametric finite elements based on Mindlin plate theory', Proc. Symp. on Applications of Computer Methods in Engineering, Los Angeles, 1977, pp. 851-858.
- [15] Hughes, Int. j. numer. methods eng. 11 pp 1529- (1977)
- [16] Macneal, Comp. Struct. 8 pp 175- (1978)
- [17] Belytschko, Int. j. numer. methods eng. 19 pp 405- (1983)
- [18] Bathe, Int. j. numer. methods eng. 21 pp 367- (1985)
- [19] Hinton, Com Struct. 23 pp 409- (1986)
- [20] Zienkiewicz, Int. j. numer. methods eng. 23 pp 1873- (1986)
- [21] Zienkiewicz, Commun Appl. Numer. Methods 3 pp 301- (1987)
- [22] and , 'Mixed methods for F. E. M. and the patch test. Some recent developments', Analyse Mathematique et Applications, Gauthier Villars, Paris, 1988, to appear. · Zbl 0661.65108
- [23] and , 'A new six-noded flat triangular element for the analysis of shells', to appear.
- [24] The Finite Element Method, 3rd edn., McGraw-Hill, London, 1977.
- [25] Robinson, Proc. F. E. M. in the Commercial Environment 1 pp 217- (1978)
- [26] 'Program for triangular bending elements with derivative smoothing', Int. j. numer methods eng., 333-345 (1973).

- [27] Skew Plates and Structures, Pergamon Press, Oxford, 1963. · [Zbl 0124.17704](#)
- [28] Private communication, 1987.
- [29] Coull, Proc. Inst. Civil Eng. 37 pp 75– (1967) · [doi:10.1680/iicep.1967.8440](#)
- [30] Zienkiewicz, Commun. appl. numer methods 1 pp 3– (1985)

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