NUMERICAL ANALYSIS OF A LOCKING-FREE MIXED FINITE ELEMENT METHOD FOR A BENDING MOMENT FORMULATION OF REISSNER-MINDLIN PLATE MODEL

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ABSTRACT. This work deals with the approximation of the bending of a clamped plate modeled by Reissner-Mindlin equations [3]. It is known that standard finite element methods applied to this model lead to wrong results when the thickness t is small. We propose here a mixed formulation in terms of the bending moments, shear force, rotations and transversal displacement. To prove that the resulting mixed variational formulation is well posed, we use standard Babuška-Brezzi theory with appropriate t -dependent norms [2]. The problem is discretized by standard finite elements [1], and error estimates are proved with constants independent of the plate thickness. Finally, we report numerical experiments confirming the theoretical results.

Keywords: Reissner-Mindlin plate; mixed finite elements; locking-free; error analysis.

Mathematics Subject Classifications (2000): 65N12, 65N30, 74S05, 74K20.

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