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BUCKLING OF REISSNER-MINDLIN PLATES

Carlo Lovadina[a], David Mora[b] and Rodolfo Rodríguez[b]

[a]*Dipartimento di Matematica, Università di Pavia e I.M.A.T.I.-C.N.R., Via Ferrata 1, I-27100, Pavia, Italia, carlo.lovadina@unipv.it, http://www-dimat.unipv.it/~lovadina/*

[b]*Departamento de Ingeniería Matemática, Facultad de Ciencias Físicas y Matemáticas, Universidad de Concepción, Casilla 160-C, Concepción, Chile, david@ing-mat.udec.cl, rodolfo@ing-mat.udec.cl, http://www.ing-mat.udec.cl/~rodolfo*

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Abstract. The aim of this work is to study the numerical approximation of the critical buckling load of a plate modeled by *Reissner–Mindlin* equations (Smith, 1995). The buckling coefficients are the eigenvalues of a variational spectral problem whose resolvent operator is bounded but not compact, which makes more difficult its spectral characterization. A similar phenomenon arising in 3D elasticity has been analyzed by Dauge and Suri (2002). A spectral characterization of the buckling equations for the Reissner–Mindlin is obtained in the present work by using the Helmholtz decomposition of the shear term analyzed in (Arnold and Falk, 1989).

Next goal is the finite element approximation of the buckling coefficients. With this aim, it is particularly important to avoid the numerical *locking* which typically arises from standard methods when the plate thickness is small. To avoid this, we use the *DL3* elements proposed by Durán and Liberman (1992). For the analysis we adapt the spectral theory for non compact operators from (Descloux et al., 1978) to obtain optimal order error estimates and a double order for the buckling coefficients. These estimates turn out to be independent of the plate thickness and, consequently, locking-free.

Finally, some numerical experiments are reported to confirm the theoretical results and to assess the performance of the proposed method.

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