A Discontinuous Petrov–Galerkin Method for Reissner–Mindlin Plates

Führer, T., Heuer, N., Niemi, A. (2023). A Discontinuous Petrov–Galerkin Method for Reissner– Mindlin Plates. SIAM Journal on Numerical Analysis, 61 (2), pp. 995-1017. https://doi.org/10.1137/22M1498838

Abstract

We present a discontinuous Petrov–Galerkin method with optimal test functions for the Reissner– Mindlin plate bending model. Our method is based on a variational formulation that utilizes a Helmholtz decomposition of the shear force. It produces approximations of the primitive variables and the bending moments. For any canonical selection of boundary conditions the method converges quasi-optimally. In the case of hard-clamped convex plates, we prove that the lowestorder scheme is locking free. Several numerical experiments confirm our results.

Keywords

DPG method; Plate vending; Reissner-Mindlin model; Locking.