

A TIME-STEPPING DPG SCHEME FOR THE TIMOSHENKO BEAM MODEL.

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ABSTRACT. We introduce and analyze a discontinuous Petrov-Galerkin method with optimal test functions for the Timoshenko beam bending model in its time-dependent version. The scheme is based on the backward Euler time stepping and uses an ultra-weak variational formulation at each time step. We consider various boundary conditions, combining clamped, simply supported, and free ends. Our scheme approximates the transverse deflection and bending moment. It converges quasi-optimally in L^2 and is locking free. Several numerical results illustrate the performance of our method.

Keywords: Beam Bending, Timoshenko Model, Discontinuous Petrov–Galerkin Method, Optimal Test Functions

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