

AN ULTRAWEAK FORMULATION OF THE TIMOSHENKO BEAM BENDING MODEL AND DPG
APPROXIMATION

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In this work we propose and analyze a new discontinuous Petrov–Galerkin (DPG) method with optimal test functions for the stationary Timoshenko beam model. We eliminate the rotation and shear force unknowns and formulate a ultra–weak variational formulation (UWVF) with deflection and bending moment as main unknowns. Moreover, we incorporate the explicit dependence on the thickness parameter and hence, we can extend our analysis and results to the Euler–Bernoulli model. Then, using a general framework, we prove the well–posedness of the our ultra–weak variational formulation with the corresponding error estimates. Finally, we report several numerical experiments which shows the good performance of this method.