Meeting: 1003, Atlanta, Georgia, SIAMMINI 2, SIAM Minisymposium on Discontinuous Galerkin Methods: Theory and Applications

1003-65-995 **Fatih Celiker*** (celiker@math.umn.edu), 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455, and **Bernardo Cockburn** (cockburn@math.umn.edu), 127 Vincent Hall, 206 Church Street SE, Minneapolis, MN 55455. *Locking-Free Optimal hp-Discontinuous Galerkin Methods For Timoshenko Beams.*

With the ultimate goal of eliminating a long history of issues that have plagued the structural mechanics community such as the locking phenomenon, we analyze a family of discontinuous Galerkin methods for the Timoshenko beam problem. We prove optimal rates of convergence in the energy seminorm and the L^2-norm. The error estimates are uniform with respect to the thickness-to-length ratio of the beam, which shows that the method is free from shear locking. We also show that the method achieves exponential convergence if the exact solution is smooth enough. The theoretical findings are verified by a series of numerical experiments. (Received October 01, 2004)