

## **A DPG method for shallow shells**

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### **Abstract**

We develop and analyze a discontinuous Petrov–Galerkin method with optimal test functions (DPG method) for a shallow shell model of Koiter type. It is based on a uniformly stable ultraweak formulation and thus converges robustly quasi-uniformly. Numerical experiments for various cases, including the Scordelis–Lo cylindrical roof, elliptic and hyperbolic geometries, illustrate its performance. The built-in DPG error estimator gives rise to adaptive mesh refinements that are capable to resolve boundary and interior layers. The membrane locking is dealt with by raising the polynomial degree only of the tangential displacement trace variable.

### **Keywords**

74S05, 74K25, 35J35, 65N30, 35J67.