Graham, I. G.; **Hackbusch, W.**; **Sauter, S. A.**

Hybrid Galerkin boundary elements: Theory and implementation. (English) Zbl 0966.65091

Numer. Math. 86, No. 1, 139-172 (2000).

The authors apply results [ibid. Numer. Math. 86, No. 1, 103-137 (2000; reviewed above)], to a new quadrature method for computing linear boundary element Galerkin stiffness matrices for 3D boundary integral equations. The computation of non-singular Galerkin integrals is performed, in contrast to the usual triangle based Gauss quadrature, by using a subset of nodes of the mesh. This allows to reuse the computed values of the integral kernel at mesh points for several elements of the system matrix.

Combined with standard methods for singular Galerkin integrals this provides a method with the same stability and convergence properties as the true Galerkin method but the complexity is comparable to collocation or Nyström methods. The authors prove stability results for piecewise smooth Lipschitz boundaries and non-quasiuniform meshes. Numerical experiments confirm the predicted performance of the method.

Reviewer: Gunther Schmidt (Berlin)

MSC:

65N38	Boundary element methods for boundary value problems involving PDEs	Cited in **7** Documents
65N12	Stability and convergence of numerical methods for boundary value problems involving PDEs	
65Y20	Complexity and performance of numerical algorithms	
35J25	Boundary value problems for second-order elliptic equations	

Keywords:

boundary integral equations; discrete Galerkin method; Nyström method; quadrature method; boundary element; stability; convergence; complexity; collocation; numerical experiments; performance

Full Text: DOI