

ON THE REGULARIZATION OF GALERKIN BEM HYPERSINGULAR BILINEAR FORMS

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We will discuss about the definition and regularization of bilinear forms related to Galerkin Boundary Element Methods for elliptic and hyperbolic problems, which involve double integrals with hypersingular kernels in space variables.

At first, starting from the classical definition of Hadamard Finite Part Integral, various characterizations of this type of integrals in one and two dimensions will be given, extending those recently presented in [2]. These characterizations are used to give a meaning to the so-called hypersingular bilinear form arising in the weak formulation of elliptic and hyperbolic problems with Neumann boundary conditions, rewritten in terms of hypersingular Boundary Integral Equations.

A unifying view of different regularization technique used in this context by mathematicians and engineers (see e.g. [3, 1]) will be given.

References

- [1] G. Frangi, *Elastodynamics by BEM: a new direct formulation*, Int. J. Numer. Meth. Engrg., 45 (1999), 721–740.
- [2] G. Monegato, *Definitions, properties and applications of finite part integrals*, J. Comput. Appl. Math., 229 (2009), pp. 425–439.
- [3] J.C. Nédélec, *Approximation par potentiel de double couche du problème de Neumann extérieur*, C. R. Acad. Sci. Paris Sr. A-B, 286 (1978), no. 2, A103–A106.