Domain Decomposition FEM-BEM Coupling and BEM-BEM Coupling Methods

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Abstract. The finite element method (FEM) and the boundary element method (BEM) are powerful computational techniques for obtaining approximate solutions to the partial differential equations that arise in scientific and engineering applications. Each method has its own range of applications where it is most efficient and neither enjoys the distinction of being "the best" for all applications. Thus, it is conceptually and computationally very attractive to subdivide the computational domain into sub-domains in which the most appropriate solution technique is applied. This approach has been addressed in many publications, mainly in the context of finite element-boundary element (FEM-BEM) coupling [1-2].

In boundary element analysis, sub-domain partition (BEM-BEM coupling) may be employed when the domains under consideration are governed by individual differential equations and/or constructed of different materials. Besides, in the case of domain with complicated boundary profile, the domain may be decomposed for better computational efficiency and accuracy [1,3].

We present a critical review of the conventional and most recent (domain decomposition) FEM-BEM coupling and BEM-BEM coupling methods.

References:

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