SOME BOUNDARY ELEMENT APPLICATIONS IN INDUSTRY

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Abstract

The boundary element method (BEM) offers important advantages over "domain" type solutions such as finite element method (FEM). One of the most interesting features of the method is the much smaller system of equations and considerable reduction in the data required to run a problem. It has been known for a long time that it is possible to formulate boundary integral equations (BIE) with singular kernels to solve boundary value problems (BVP) of the linear elliptic type. The unknown boundary data in the solution depend on the prescribed boundary data through those BIE. Once all boundary data become available, the solution of the given partial differential equation is obtained at any point in the domain by an application of Green's formula. The traction and displacement Green's functions which derive from Navier's equations will be obtained as well as the governing boundary integral equations (BIE) for a given specimen, i.e., . The unknowns will be solved for by using the Gaussian elimination method.

In this study, some realistic specimens in industry such as mode II test specimen, circular ring with diametrically opposite loads, lateral plate of rescue robot, and spur gear will be discussed. The results will show the potential application of the BEM in industry.

Keyword：boundary element method (BEM), finite element method (FEM), boundary value problems (BVP), boundary integral equations (BIE)