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A SIMPLE MULTI-DOMAIN BEM WITH THE FAST MULTIPOLE METHOD

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In this talk, we present a simple boundary element method (BEM) formulation for multi-domain problems. In the traditional BEM for multi-domain problems, the BEM equations from each subdomain are assembled and one half of the variables on the interface between the two domains are eliminated by using the interface conditions. Though smaller systems of equations are formed, this approach is problem dependent and thus is tedious in implementation for different configurations of the subdomains. With the advance of the fast solution methods for the BEM, solving large BEM models is no longer an insurmountable task. Thus, we propose to use a straightforward approach in the BEM for multi-domain problems. That is, we just list the BEM equations from each subdomain one-by-one in the final system of equations, and then list all the interface conditions as additional equations in the system. This can be done systematically regardless of the configurations of the subdomains. Therefore, it will facilitate easy implementation of the fast multipole BEM for different multi-domain problems. Applications of this simple approach to solving multi-domain problems with the fast multipole BEM in modeling porous materials and fiber-reinforced composites will be presented. The advantages and disadvantages of this simple approach, as compared with other multi-domain BEM approaches, will be discussed.

REFERENCES

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