

It is time to develop analysis tools based on boundary integral equation

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Abstract

Within a successful CAE driven product development, there are two fundamental requirements: a seamless interaction between the CAD and CAE software tools and a fast solver for very large scale computation. The former is associated with the discretization of any complexly shaped domain into elements for a mesh-based method, such as the Finite Element Method (FEM) or Boundary Element Method (BEM). In the best case modifications in the CAD model can be transferred to the CAE model and vice versa. Unfortunately, there are exists no standard approach to ensure a seamless interaction. The second issue is inevitable for a daily design process, as a complete simulation chain for practical problems usually involves very large scale computations and can be very long. This talk gives the reasons why presently it is time to develop analysis tools based on boundary integral equation, and shows with a number of application examples how the newly proposed Boundary Face Method (BFM) facilitated with the Hierarchical Matrix and Adaptive Cross Approximation (ACA) can satisfy both the requirements properly.

Keywords: CAE driven product development, boundary face method, hierarchical matrix, adaptive cross approximation.