

Numerical Investigation of FEM/BEM Interactions and Advantages in Analysis of Pile-Soil Interaction

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Abstract:

According to high efficiency and significant progress of different numerical methods upon the capability of each, during recent years researchers have increasing tendency to mix and use them. Domain decomposition methods provide not only the basic technology for parallelizing numerical algorithms for solving Partial Differential Equations (*PDEs*) but also for coupling different physical fields and different discretization techniques. Beside the Finite Element Method (*FEM*) which is very powerful numerical method, Boundary Element Method (*BEM*) is certainly one of the most popular discretization techniques for *PDEs*. Hence, because of their complementary properties, these two methods have been combined during recent years which the result method is proper for problems with unbounded regions like soil-structure interaction problems. This combined method have some significant advantages such as less computation time, less memory space more analyze speed, and more accuracy in open boundary problems, which are same as *BEM* and powerful method for analyzing different bodies with different shapes and solve complicated equations which are same as *FEM*, that will be explained in this paper.

Furthermore algorithm of the combination of *FEM* and *BEM* program which has been developed, is explained briefly and developed program is verified upon the comparison of proposed results with experiments. The developed computer program is able to define two domain simultaneously upon two different forms of meshing . To show the capability of the program, the predicted results are verified through the comparison of experimental result of soil-pile interaction problem which is semi-infinite region. The employed mixed mesh is such that the soil is discretized by *BEM* and pile via *FEM*.