# Some Knowledgegained from My 30 Years Investigation on Boundary Element Methods

Zhenhan Yao

Department of Engineering Mechanics, Tsinghua University, Beijing, 100084 China

Abstract: The author devotes in the investigation on boundary element method for 30 years. It is fully realized that the boundary element method is an important supplement of the finite element method. The research on BEM should fully display its own advantages, including: as a dimension reduction method, it is advantageous for the description of the actual geometrical shape; by using of the analytical fundamental solution, it has higher accuracy of the analytical-numerical combined methods; it is advantagious to deal with the problems related to infinite domain, and it is also easier to treat very large finite domain; it is easier to find out the singularity of stress, and also suitable to deal with the problem with singular stresses, such as the fracture problems; it is also advantageous to deal with the boundary nonlinear problems, such as the elastic contact problem; the display of the results obtained by BEM should not simply copy that applied in FEM. The conventional BEM is difficult to deal with the large-scale problems because the matrix of the BEM equation system is dense. This draw back has been overcome in recent years by introducing the fast multipole method. But to develop the practical applications on large scale scientific and engineering problems, it is required to work hard on the development of the software of fast multipole BEM. In addition, it should be mentioned that the selection of the elements is important for the computation using BEM, the simplest element is not always reasonable.