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STUDY ON ADAPTIVE NUMERICAL ANALYSIS METHOD FOR ELASTIC PROBLEMS

Chunxiao Yu, Yiming Chen

College of Science
Yanshan University
Qinhuangdao 066004, China
{ chxy, chenym }@ysu.edu.cn

Yunfeng Mu

College of Information Science and Engineering
Yanshan University
Qinhuangdao 066004, China
muyunfengyd@sina.com.cn

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Abstract. *In this paper, a kind of adaptive Boundary Element Method (BEM) is proposed for the element meshes subdivision to save a large amount of pre- and post-treatments. In addition, a new adaptive error analysis method is developed in the adaptive process, which can greatly improve the computational accuracy of the BEM solutions.*
Keywords: Adaptive BEM, Meshes subdivision, Adaptive error analysis

1. **Introduction.** The so called Boundary Element Method (BEM) [1,2] is a powerful tool for the computational mechanics and computational mathematics. Compared with the Finite Element Method (FEM), the construction of BEM discrete meshes is relatively simple because of the reduced dimension. However, to improve the computational efficiency and avoid the subjective mistakes, it is necessary to develop optimization methods in the BEM domain for the automatic generation of discrete meshes. The fundamental thought of the adaptive BEM [3-7] is to automatically judge and improve the accuracy of BEM solutions by computer. Using the adaptive BEM program, the analysts only need to define a discrete mesh that can reflect the geometric characteristic of the boundary and to specify the required precision of the BEM solutions. Then the computer will automatically start an iterative process to generate an optimization discrete mesh to satisfy the precision requirement. It is obvious that the research and application of the adaptive process is of vital importance.

Generally, the precision of BEM solutions can be improved through the following processes [7]. Firstly, subdivide the elements with bigger error, while the total number of elements is increased but the exponent number of interpolation function is kept invariable, which is called "H-process". Secondly, increase the exponent number of interpolation function for the elements with bigger error, while the total number of elements is kept invariable, which is called "P-process". Thirdly, rearrange the boundary nodes for the elements with bigger error, which is called "R-process". Fourthly, the combination of the