A Boundary Element Application in Dissimilar Materials

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Abstract

As described in [1] the weight of one lateral plate of the rescue robot has been reduced 1 kg of mass (from 3 kg to 2 kg) by cutting off some redundancy regions but won't lower the strength that much (allowable stress is reduced from MPa to MPa) at all. Moreover, the weight of the rescue robot can be reduced more if we replace the aluminum alloy lateral plate by POM. However, the toughness of the rescue robot will also be reduced under these circumstances. In addition, because of some defects occur during the manufacturing process failure will happen in the POM lateral plate and therefore, cause the dangerous situation during rescuing process. The heavy loading portion of the POM lateral plate will then be replaced by aluminum alloy to avoid this dangerous situation. The primary purpose of this research is to demonstrate the important of stress analysis of this dissimilar materials compound lateral plate by using the Boundary Element Method (BEM). According to [2] the first step in the BEM solution is to divide the homogeneous medium into two bodies $B\gamma$ ( ) along the center line which we call the interface. The compound lateral plate will be divided into four bodies $B\gamma$ (and 4) along the center line of the homogeneous and non-homogeneous medium and will neither heavy as the aluminum one nor easy to failure as the POM. The lightness and rigid robot will be obtained according to the new design of this research.

Keyword：Boundary Element Method (BEM)