

## **ANALYSIS OF TWO-DIMENSIONAL CRACK PROBLEMS USING X-FEM AND WAVELET GALERKIN METHOD**

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### **ABSTRACT**

Crack problems are analyzed using extended finite element method and wavelet Galerkin method. Wavelet Galerkin method is a new methodology to solve partial differential equations [1][2]. Scaling/wavelet functions are used as the basis function. In the wavelet Galerkin method, scaling functions are placed throughout the domain of analysis and it is divided by equally spaced structured cells to integrate the stiffness matrices. To improve the accuracy, wavelet functions are overlaid on the scaling functions within the regions of high stress concentration, such as the vicinities of hole edge, crack tip, etc. It is then easy to control spatial resolution in the solid mechanics analysis. However, since all the basis functions in the wavelet Galerkin method are assumed to be continuous, there are difficulties in treating displacement jumps across the crack face. In present research, the discontinuous displacement functions and asymptotic crack tip solution are introduced based on the concept of the extended finite element method [3][4]. The proposed method can perform the crack propagation analysis without any remeshings. In this presentation, mathematical formulations of the wavelet Galerkin method for the two-dimensional crack problems and its numerical implementations are described.

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