

Crack Growth Analysis

There are many Finite Element software packages for crack growth analysis currently available. However, they all have a common drawback, which is the requirement for remeshing as the crack propagates. This software utilizes the state-of-the-art development in the boundary element method and for the first time removes the difficult and time consuming task of remeshing. Furthermore, it evaluates accurate stress intensity factors for which the Boundary Element Method is renowned. The software uses the established criterion for crack propagation and evaluates the residual strength as well as fatigue life calculations.

MAIN FEATURES:

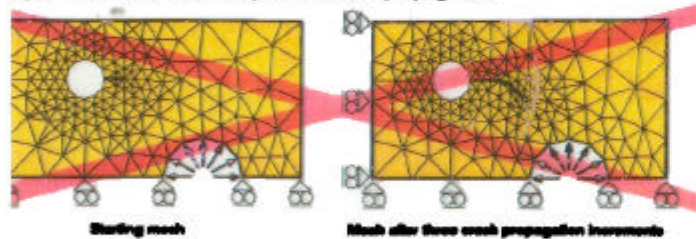
- ☆ Automatic incremental crack propagation
- ☆ Eliminates remeshing for crack growth analysis
- ☆ Accurate evaluation of stress intensity factors
- ☆ Residual strength and fatigue life computations.

MODULES IN THE SOFTWARE:

- ☆ Data generation with a minimum of input
- ☆ Plotting of the mesh
- ☆ Automatic fatigue crack growth analysis
- ☆ Plotting of the deformed configuration and principal stresses
- ☆ Plotting of the crack path

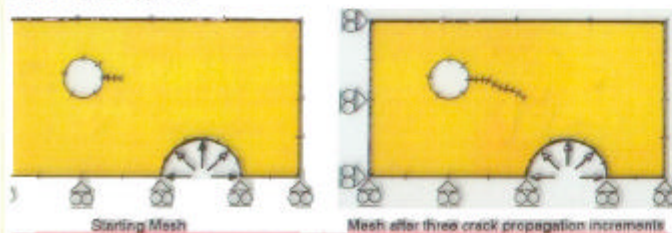
The old approach

Element approach: continuous remeshing and repeated resolutions are required for crack propagation.



The new approach

The Boundary Element approach: No remeshing is required for crack propagation.



Program Description

The software features include the use of quadratic continuous and discontinuous elements, evaluation of boundary stresses, displacements and tractions, element or point constraints including skew constraints and mixed mode path independent integrals for the accurate evaluation of stress intensity factors. Automatic crack propagation algorithm is implemented utilizing an incremental crack extension which employs special solver to avoid resolution for each crack extension.

The fracture criterion is based on the maximum principal stress and the fatigue crack growth rates are calculated using established formulae.

The software package is accompanied with a user manual for data generation and the analysis program as well as a book *Boundary Elements in Crack Growth Analysis* describing the basic theory of the

method. The source code in FORTRAN is included along with several example problems to demonstrate the use of the code. The Boundary Element Method (BEM) is now widely regarded as the most accurate numerical tool for analysis of crack problems in linear elastic fracture mechanics. This software package is based on a new formulation of BEM called *Quadratic Boundary Element Method (QSBEM)* developed at the Damage Tolerance Division of Wessex Institute of Technology. *The Quadratic Boundary Element Method* retains all of the important features of BEM which are: reduced set of equations, simple data preparation, accurate evaluation of stresses, strains and displacements at selected internal points as well as introducing additional improvements which include crack modelling in a single region and accurate stress intensity factors evaluation.



ORDER FORM

Please send me the following software package

Quantity	Title/Author	Price
	Crack Growth Analysis using Boundary Elements by A. Portela and M.H. Aliabadi	£675*

*£995 for USA, Canada and Mexico - postage & packing UK £497, USA \$5199.

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From Portela

Nov. 1993