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Juha Kuutti, Kari Kolari

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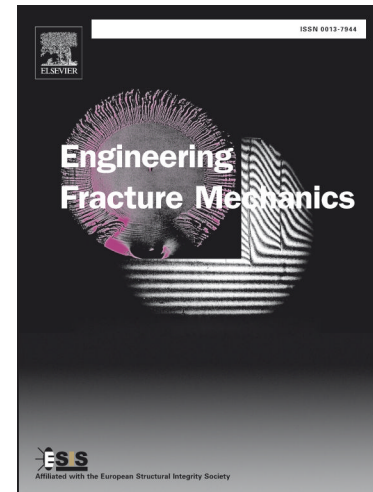
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Interaction of periodic arrays of wing cracks

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Juha Kuutti*, Kari Kolari

VTT Technical Research Centre of Finland, P.O. Box 1000, FI-02044 VTT, Finland

*Corresponding author, juha.kuutti@vtt.fi

Abstract

A method for evaluating the interaction of wing cracks in 2-D and 3-D is presented. The method utilizes the assumption that the wing crack can be represented by its extensions and the interaction is solved using a superposition method presented by Kachanov. The method is applied to arrays of parallel initial cracks to determine the critical crack array orientations and assess whether the coalescence of closely-spaced small cracks causing a shear-like failure observed in 2-D is possible in 3-D. The results show that the shear failure can be achieved also in 3-D, but not with such an instability as in 2-D.

Keywords

Brittle fracture; Shear fracture; Crack interaction, Wing crack

Highlights

- Study of 3-D wing crack interaction showed the possibility of shear-like failure
- The interaction affected the critical load more than the flaw propagation direction
- Crack growth direction and fault plane angle agree qualitatively with experiments
- Unstable fracture observed in 2-D geometries was not reached with the 3-D system

Note from the authors

The figures and tables in the manuscript have been formatted to suit the two column page layout of the journal. All figures are greyscale.

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