Description of data

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If you noticed any mistakes or have other comments to share, please contact Leon Kellner.

Context

The data corresponds to the paper “Study on the Cohesive Edge Crack in a Square Plate with the Cohesive Element Method” (2020) by Leon Kellner, Wenjun Lu, Sören Ehlers and Knut V. Høyland, which has been submitted to the International Journal of Fracture.

The paper presents a two dimensional model of a finite square plate with an edge crack running through the plate. The main findings were the forces required to propagate the crack and the size of the process zone.

The data includes everything used to generate the plots and diagrams in the paper. Furthermore it comprises data from simulations that were used to validate the applied approaches.

Data gathering methods

The data was mainly created by postprocessing results from simulations combining the finite element- and the cohesive zone method. The simulations were run with the structure solver LS-Dyna. To enable the postprocessing, a material model subroutine was written in FORTRAN, which outputs additional information from the cohesive elements. This information was further processed with a python script, which in turn gave a table as an output. Finally, these tables were processed with MATLAB to generate the plots.

Structure of data

There are three main files. The key results are given in the parameters & results file. Here, one part presents the model parameters with respect to geometry and the cohesive zone model. The remaining parts give the splitting force required to propagate the crack and the sizes of

the process zone. This is given for different plate sizes and different softening laws of the cohesive zone model. Lastly, mesh metrics are given, e.g. element sizes, for the different plate sizes used.

A second file gives stresses and forces over simulation time for a simple model with two rectangular shell elements and one cohesive “beam” element in between. This was used to validate forces and stresses of the cohesive beam elements.

A third file gives forces over time for one model and different material models. Here, the programmed material models are compared to available material models from the LS-Dyna material model library. This was done to validate the programmed material models.

Terms of use

Contributions

Both Wenjun Lu and Leon Kellner contributed to generating the data.