StressCheck

Providing Unique Fracture Mechanics Capabilities with a Confirmation of Reliability

The Fracture Mechanics module gives you the power of all the technology and functionality that is built into StressCheck.® The hierarchical element formulation and modeling framework gives you confidence that the results are reliable.

The Fracture Mechanics Analysis module provides the most reliable and robust methods in the industry for the computation of Stress Intensity Factors (SIF) and energy release rates. It is well known that a small error in the computed SIF can lead to a large error in the predicted crack growth life. Therefore accurate and reliable computation of SIFs is of major importance whenever requirements for damage tolerance and residual strength must be met.

The unique pre- and post-processing features of the Fracture Mechanics Analysis module clearly set StressCheck apart from other FEA products. From automatic meshing of embedded cracks to point-and-click extraction of the SIF with automatic convergence information, StressCheck provides essential feedback to support crack growth analysis, especially when the predicted crack growth life is highly sensitive to small errors in the SIF. Additionally, StressCheck uses a superconvergent extraction method, known as the "contour integral method", to compute SIFs, and calculates energy release rates using the J-integral.

"Aerospace materials scientists and structural engineers now have a new state-of-the-art software product called StressCheck, which provides efficient and reliable analysis tools for … aircraft structures."

Air Force Research Laboratory

"StressCheck's quality control features have given us the tool we need to perform detailed … bonded joint analysis with confidence that the results are accurate. … StressCheck also allows us to perform these analyses with much improved ease as compared to older technologies."

"The addition of incremental theory of plasticity in StressCheck has greatly improved our ability to accurately predict the fatigue life of joints with interference fit fasteners and cold worked holes. This ability is especially important, not only in support of maintaining aging aircraft …"

The Boeing Company

"The software provides a highly reliable and user-friendly production stress analysis tool that will replace the Finite Element Method (FEM) tools and failure criteria the experts currently employ for analyzing bonded joints."

Lockheed Martin

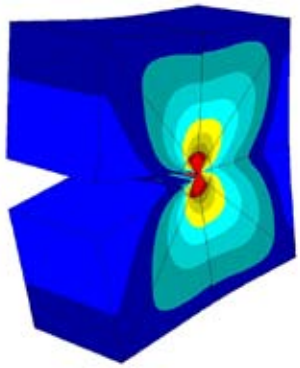
FRACTURE MECHANICS

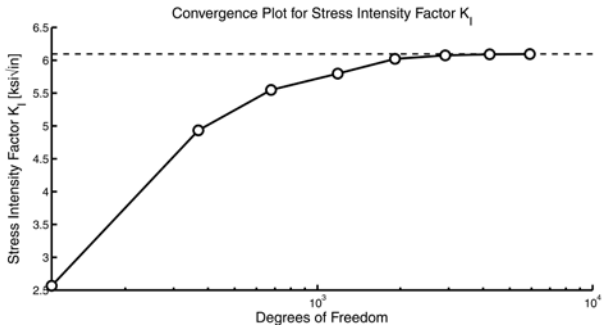
StressCheck

StressCheck® offers the most reliable and robust methods for SIF computation in the industry. From unique modeling capabilities, to advanced analysis technology, to powerful post-processing functions – StressCheck is the tool for reliable, detailed stress analysis. See why the Fracture Mechanics Analysis module can be one of the most important tools in your design and analysis toolbox. Try StressCheck today!

FRACTURE MECHANICS ANALYSIS MODULE

The Fracture Mechanics Analysis module offers unique features that clearly set StressCheck apart from other FEA products. These include automatic meshing of 2D and 3D part models with embedded cracks, and powerful post-processing capabilities such as point-and-click extraction of the stress intensity factor (SIF) at the crack tip for 2D and along the crack front for 3D models with automatic convergence information providing the analyst with confidence in the quality of the solution. This feedback is essential when the predicted crack growth life is highly sensitive to small errors in the SIF. StressCheck uses a superconvergent extraction method, known as the contour integral method (CIM), to compute the SIFs. Since all models in StressCheck can be parametric, you can, for example, define the crack parametrically to solve multiple configurations of the model.

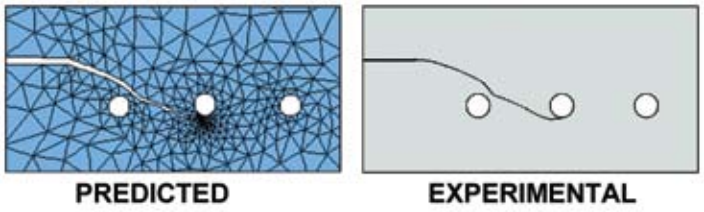




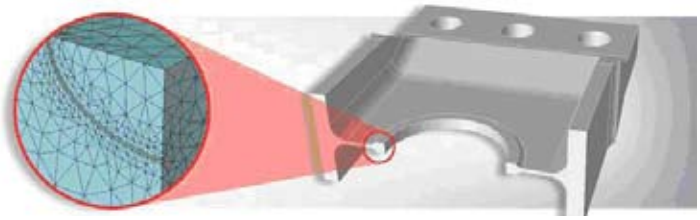
You will appreciate the incredibly simple point-and-click methods for obtaining:

- Mode 1 and mode 2 stress intensity factors, K1 & K2, and the T-stress for cracks in linear-elastic materials (2D, 3D, axisymmetric).
- J-integral for cracks in elasto-plastic and orthotropic materials.
- SIFs for cracks growing from filled holes. Use multi-body contact analysis to simulate the effects of interference-fit fasteners and press-fit bushings.

The Crack Path Analysis functionality provides an automated procedure for computing through-the-thickness SIFs along a predicted crack propagation path for a loaded 2D planar model as well as the crack trajectory. You have the option to specify an initial crack or multiple cracks. If no initial crack is specified, StressCheck will compute the location of the maximum first principal stress and initiate crack growth from that location. A table summarizing the SIFs, crack length, crack tip angle and location is generated automatically. This procedure uses local mesh refinement at the crack tip and the superconvergent CIM to compute accurate SIFs along the predicted crack path.



With StressCheck you can embed a crack in a solid CAD body and invoke the automesher to recognize the crack face and generate a graded mesh refinement towards the crack front to assure an adequate number of degrees of freedom in the extraction zone. The crack is modeled as a parametric body unioned into the solid body. When the user updates a parameter value to change the crack dimensions, the body is automatically remeshed. This facilitates the simulation of crack propagation from a corner crack to a though-the-thickness crack using a single model.



For enhanced fracture mechanics analysis and to further integrate these capabilities into your environment, you can integrate StressCheck and the Fracture Mechanics Analysis module with your own or third party crack initiation and crack growth programs. This is done using StressCheck Toolkit, which is an API-based COM industry standard interface technology.

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