

(FRACTURE MECHANICAL) MATERIAL PROPERTIES OF STEELS OF HISTORICAL WELDED BRIDGES

Content

Since about 1950, steel railroad bridges have increasingly been welded. In the near future, these bridges will reach an age that requires an evaluation with regard to their ongoing use. For this purpose, an evaluation can be made on the basis of fracture mechanics concepts, which are carried out with the aid of crack propagation calculations.

A number of input parameters is required for these crack propagation calculations. The crack propagation parameters C and m , as well as the lower and upper threshold values (ΔK_{th} and ΔK_{IC}) are necessary for the calculation of stable crack propagation on the basis of the Paris curve (Figure 1). These values can be determined by a series of complex tests. Since there is currently no material available for test specimens, the material parameters from test reports and literature are to be summarized and subsequently (statistically) evaluated in this final thesis. If appropriate, distribution functions should also be assumed in order to take into account possible scattering of the material parameters. Here, too, recommendations from literature and guidelines should be consulted. Subsequently, the influence of the variation of the obtained material parameters on the crack propagation is to be evaluated on the basis of a simple structural example detail.

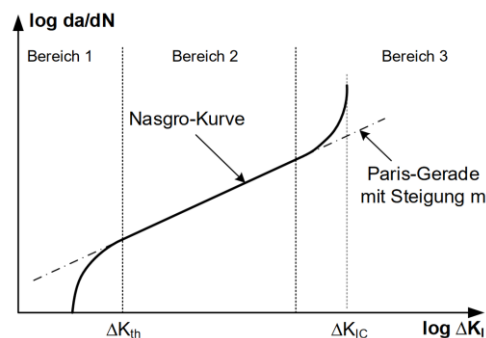


Figure 1: Stable crack propagation described by the Paris law

Tasks

- Extensive literature research on fracture mechanics material parameters of historical welded steel bridges
- Preparation and statistical evaluation of the resulting "material database"
- If appropriate, adoption of distribution functions of the material parameters
- Evaluation of the influence of different material parameters on crack propagation

Processing period

flexible, from now on

Prerequisites

Basics in fracture mechanics and statistics
beneficial

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