Fatigue Benchmark Repository - FABER (CA23109)

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Key Words: *Fatigue life estimation, benchmark, fatigue estimation software, experimental fatigue data.*

Abstract

Fatigue damage is the key factor in 80-90% of in-service failures of structural components. In any design, it is essential to be able to estimate the potential fatigue damage safely and expertly. Commercial fatigue solvers are program tools dedicated to allowing even a not very expert user to perform a straightforward fatigue life prediction. However, the fatigue damage process is very complex. It involves a large number and a large range of variables. The computation process is based mostly on empirical experience. Currently-used fatigue solvers are based on experimental evidence acquired during first two thirds of the 20th century. Although very many experiments have been conducted in the meantime, the computational basis has remained fixed, and little effort has been dedicated to a redefinition. The lack of interest of academia in the topic, the tendency of fatigue solver developers to implement computational strategies without understanding the problem adequately, the use by inexperienced and inexpert users, and final warranty denial for the results of fatigue solvers have led to a critical mass of problems, which can be marked as a loss of responsibility. Our broad networking project funded by the COST Association focuses on preparing sets of curated experimental fatigue data, which will be used for creating benchmark sets. Users from academia and from engineering sectors will be able to adopt the benchmark sets quickly for testing various prediction hypotheses and various computational tools. In addition, an open-source fatigue software will be prepared to demonstrate typical range of errors that can be reached if using the current computational strategies. Only such joint action can restore a responsible attitude for the computational results provided by fatigue solvers.