# Comparative Analysis of Deterministic and Probabilistic Fracture Mechanical Assessment Tools

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Uncertainties in material properties, manufacturing processes, loading conditions and damage mechanisms complicate the quantification of structural reliability. Probabilistic structure mechanical computing codes serves as tools for assessing leak- and break probabilities of nuclear piping components. Probabilistic analyses of primary circuit components may be required by regulatory demands, or quantify trends, e.g. the effect of different in-service inspection procedures. Probabilistic fracture mechanical tools were compared in different benchmark activities, usually revealing minor, but systematic discrepancies between results of different codes.

In this joint paper, probabilistic fracture mechanical codes are compared. Crack initiation, crack growth and the influence of in-service inspections are analyzed. The yearly probabilities for leaks and breaks during operation are computed. Example cases for stress corrosion cracking and fatigue in LWR conditions are analyzed.

The evolution of failure probabilities during simulated operation time is investigated, in order to identify the reasons for differences in the results of different codes. The comparison of the tools is used for further improvements of the codes applied by the partners.

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