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Various types of joints; 2.6.1. Plated joints; 2.6.2. Tubular joints; 2.7. References; Chapter 3. Experimental Methods and Data Analysis; 3.1. Introduction and objectives
3.2. Overview of various types of tests3.3. Stress-life testing (S-N testing) of welded joints; 3.3.1. Test specimens and test setup; 3.3.2. Preparations and measurements; 3.3.3. Test results; 3.4. Testing to determine the parameters in the strain-life equation; 3.5. Crack growth tests - guidelines for test setup and specimen monitoring; 3.6. Elementary statistical methods; 3.6.1. Linear regression analyses; 3.7. References; Chapter 4. Definition and Description of Fatigue Loading; 4.1. Introduction and objectives; 4.2. Constant amplitude loading; 4.3. Variable amplitude loading
4.3.1. Overview4.3.2. Rain-flow cycle counting of time series; 4.3.3. The energy spectrum approach; 4.4. References; Chapter 5. The S-N Approach; 5.1. Introduction and objectives; 5.2. Method, assumptions and important factors; 5.2.1. Statistics for the S-N approach, median and percentile curves; 5.2.2. Discussion of S-N curves-important factors; 5.2.2.1. The threshold phenomenon; 5.2.2.2. Mean stress and loading ratio; 5.2.2.3. Stress relieving; 5.2.2.4. The thickness effect; 5.2.2.5. Misalignment; 5.2.2.6. Post-weld improvement techniques; 5.2.2.7. Corrosive environment
5.3. Mathematics for damage calculations5.3.1. Linear damage accumulation; load spectrum on a histogram format; 5.3.2. Discussion of the validity of the linear damage accumulation; 5.3.3. Definition of the equivalent stress range; 5.3.4. Load spectrum on the format of a Weibull distribution; 5.4. S-N curves related to various stress definitions; 5.4.1. Nominal stress, geometrical stress and weld notch stresses; 5.4.2. Geometrical stresses in tubular joints; 5.4.3. Fatigue life estimate based on the weld notch stress approach; 5.4.4. Conclusions on the various stress approaches
5.5. Some comments on finite element analysis

Sommario/riassunto

Avoiding or controlling fatigue damage is a major issue in the design and inspection of welded structures subjected to dynamic loading. Life predictions are usually used for safe life analysis, i.e. for verifying that it is very unlikely that fatigue damage will occur during the target service life of a structure. Damage tolerance analysis is used for predicting the behavior of a fatigue crack and for planning of in-service scheduled inspections. It should be a high probability that any cracks appearing are detected and repaired before they become critical. In both safe life analysis and the