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Overview

The past two decades have seen the development of fractography of materials from a research tool to an important everyday component of failure analysis and materials characterization. The vast body of work in this area has led to volumes of photographs describing fractographic features in general qualitative terms. It also has presented researchers with a foundation of evidence that quantitative assignment of selected parameters can relate specific fractographic features to material properties.

On 10 Nov. 1988, a one-day symposium, sponsored by ASTM Committees E-9 on Fatigue and E-24 on Fracture Testing, was held in Atlanta, Georgia, covering the latest developments and discoveries in both methodology and interpretation of quantitative fractographic methods. It sought to provide a benchmark of progress in this science as we enter the 1990s.

In this publication, which is based upon that symposium, an overview of recent developments in quantitative fractography and computed tomography in composites is presented by *Antolovich, Gokhale, and Bathias*, while *Harvey and Jolles* relate fractographic features in HY-100 steel and 2024 aluminum to the critical strain energy density.

Alexander has attempted to relate fracture surfaces to mechanical properties by means of fractals and has found that, while fracture surface profiles are fractal, there does not seem to be a clear correlation between the fractal dimension and the mechanical properties or the microstructures.

Goldsmith and Clark present a discussion of the successful analysis of aircraft components by means of quantitative techniques that have been employed at the Aeronautical Research Laboratory in Melbourne, Australia, for the past 15 years.

Quantitative analysis of specific fracture processes is then discussed in the remaining five papers, which are the following: *Ohtsuka and Yamamoto* on hydrogen-assisted cracking; *Zhang, Kumar, Armstrong, and Irwin* on cleavage; *Harrison, Abson, Jones, and Sparkes* on brittle fracture in steel weldments; *Kurath and Fatemi* on low-cycle fatigue in steel and Inconel 718; and *Wanhill and Schra* on corrosion fatigue crack arrest in aluminum alloys.

These works demonstrate the value of applying quantitative methods to fractographic features and utilizing this information in predicting material behavior. The examples presented here by these authors further the understanding of fracture processes in polycrystaline materials and provide a sound basis for further studies.

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