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Introduction to Symposium on Quantitative Methods in the Assessment of Structural Defects

[The Symposium on Quantitative Methods in the Assessment of Structural Defects, held 24 May 1989 in Kansas City, Missouri, was sponsored by ASTM Committee E-9 on Fatigue and its Subcommittee E09.06 on Statistical Aspects of Fatigue, and ASTM Committee E-24 on Fracture Testing and its Subcommittee E24.06 on Fracture Mechanics Applications. Four papers from the symposium are presented in this issue of *Journal of Testing and Evaluation.* A. P. Berens, University of Dayton Research Institute, and R. T. Watanabe, Boeing Commercial Airplane Company, who served as symposium chairmen, have provided an Introduction.—*Editor*]

Damage tolerance analysis is now an accepted tool for evaluating the safety and durability of fatigue-susceptible structures. Safety is ensured by demonstrating that real or potential flaws will not grow to critical size before being detected. Durability can be demonstrated by evaluating the growth of a flaw population that is characteristic of the material and fabrication quality of the structure. Both of these applications are dependent on the ability to quantify inspection capability, since they require that real, potential, or equivalent flaws be characterized in terms that are amenable to fracture mechanics analyses.

The ASTM Symposium on Quantitative Methods in the Assessment of Structural Defects documented the state of the art in detecting, characterizing, and accounting for defects in structures subjected to repeated service loads. Rehbein et al. describe a procedure for characterizing the residual stress field in the wake of a growing crack using ultrasonic imaging. Baxter describes a method for depositing a thin anodic film on specimens during fatigue tests in order to detect and monitor crack growth at very short (10^{-1} to 10^{-2} mm) crack lengths. Magnussen et al. present a method for obtaining and using equivalent initial flaw sizes to characterize material quality for application to durability analyses. Jhansale and McCann present a case study of the coupling of inspection and analysis to safely extend the life of in-service steam turbine/generator rotors.

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