Overview

The science of fracture mechanics has experienced rapid advancement during the past decade with significant contributions in the areas of experimental mechanics, numerical modeling, applications, and micro-mechanical effects. This rapid advancement comes at a time when economic considerations in government and industry have necessitated extension of the "service lives" of engineering structures. A consequence of service life extension has been an increased use of fracture mechanics to defer repairs or retirement of structures or components. Application of fracture mechanics in such instances is hindered by the inability of small specimen testing, coupled with structural analysis, to accurately describe the fracture behavior of large-scale structures containing flaws. In fracture mechanics terms, this is generally regarded as a consequence of improperly accounting for crack tip and/or structural "constraint."

The purpose of the symposium was to provide a forum for an exchange of ideas on constraint effects in fracture, and to provide a focus for future work in this area. This volume includes a collection of papers that serve as a state-of-the-art review of the technical area. The volume will be useful to researchers in fracture mechanics and to engineers applying fracture mechanics in design, failure analysis, and life extension. Work presented in this volume provides a framework for quantifying constraint effects in terms of both continuum mechanics and micro-mechanical modeling approaches. Such a framework is useful in establishing accurate predictions of the fracture behavior of large structures (e.g., pressure vessels, pipelines, offshore platforms) subjected to complex loading.

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