Journal of Engineering Materials and Technology

Book Reviews

Current Research on Fatigue Cracks (in English), ed. by T. Tanaka, M. Jono, and K. Komai, The Society of Materials Science, Japan, Kyoto, 606 Japan, 1985, pp. 274.

REVIEWED BY A. J. McEVILY[1]

In recent years Japanese researchers have been active in studies of crack growth behavior, but the findings have often been presented only in the Japanese language. This publication in English is intended to present the important recent results of selected works of some of the leading Japanese researchers in an effort to promote wider dissemination of these findings and thereby contribute to worldwide progress in science and technology. It is well to be aware of these contributions which are distinguished by insight, exactitude in experimental work, and novel experimental procedures. However the editors are a bit modest, for in fact many of the authors of the papers in this volume are highly respected outside of Japan for their contributions to research.

Three topics are treated, namely, short fatigue cracks, fatigue crack growth and the threshold, and corrosion fatigue cracks. H. Nisitani discusses the behavior of small cracks and related phenomena, K. Yamada, M. Shimizu, and T. Kunio treat the threshold behavior of small cracks, M. Jono and J. Song write on the growth and closure of short cracks, K. Ogura, Y. Miyoshi and I. Nishikawa discuss small cracks at notch roots, K. Tanaka describes short crack fracture mechanics, and S. Usami discusses short cracks and component life estimation.

A. Otsuka, K. Mori, and K. Tohgo write on Mode II fatigue crack growth in aluminum alloys, A. Ohta, E. Sasaki, M. Kosuge and S. Nishijima discuss the threshold for welded joints, K. Asami deals with fatigue crack growth in high strength steel, H. Kobayashi and H. Nakamura analyze plasticity induced closure, and M. Kurihara, A. Katoh and M. Kawahara discuss the effects of stress ratio and step loading on the rate of fatigue crack growth.

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K. Komai discusses corrosion-fatigue crack retardation and enhancement in structural steels, and Y. Kondo and T. Endo write on the prediction of corrosion fatigue strength in the long life regime.

Overall then the volume provides a current assessment of stable crack growth research in Japan, and as such should be of interest to those concerned with this topic

Advanced Fracture Mechanics by Melvin F. Kanninen and Carl H. Popelar, Oxford Engineering Science Series, 15, Oxford University Press, New York, 1985, pp. 563. Price $49.95.

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The authors address the subject of fracture mechanics from the point of view of applied mechanics. A stated purpose is to present the fundamental aspects to newcomers to the field more clearly than has been done heretofore, and in this respect they have succeeded admirably. The text provides a lucid, reasoned, and comprehensive treatment of the entire field of fracture mechanics.

The first chapter introduces the topic and discusses applications, the history and the establishment of fracture mechanics, and nonlinear and dynamic considerations. The succeeding chapters deal in detail with the elements of fracture mechanics, linear elastic fracture mechanics, dynamic fracture mechanics, elastic-plastic fracture mechanics, fracture mechanics models for fiber reinforced composites, time-dependent fracture, i.e., creep and viscoelastic crack growth, and fatigue crack growth. A final chapter discusses the sources of information in fracture mechanics, and an appendix provides a compilation of fully plastic solutions for various geometries. Each chapter is well illustrated and amply referenced.

Because of the clarity of presentation and the up-to-date nature of the contents it is undoubtedly the best single source treatment of fracture mechanics available, and it is therefore highly recommended to both newcomers as well as oldcomers.