

# Contents

## Introduction

### ENGINEERING APPLICATIONS

<b>A Method of Application of Elastic-Plastic Fracture Mechanics to Nuclear Vessel Analysis—P. C. PARIS AND R. E. JOHNSON</b>	II-5
<b>Evaluation of the Elastic-Plastic Fracture Mechanics Methodology on the Basis of Large-Scale Specimens—K. KUSSMAUL AND L. ISSLER</b>	II-41
<b>Studies of Different Criteria for Crack Growth Instability in Ductile Materials—S. KAISER AND A. J. CARLSSON</b>	II-58
<b>Further Developments of a <i>J</i>-Based Design Curve and Its Relationship to Other Procedures—C. E. TURNER</b>	II-80
<b>Application of Two Approximate Methods for Ductile Failure Assessment—L. HODULAK AND J. G. BLAUEL</b>	II-103
<b>Development of a Plastic Fracture Methodology for Nuclear Systems—T. U. MARSTON, R. L. JONES, M. F. KANNINEN, AND D. F. MOWBRAY</b>	II-115
<b>Some Salient Features of the Tearing Instability Theory—H. A. ERNST</b>	II-133
<b>Verification of Tearing Modulus Methodology for Application to Reactor Pressure Vessels with Low Upper-Shelf Fracture Toughness—S. S. TANG, P. C. RICCARDELLA, AND R. HUET</b>	II-156
<b>Ductile Tearing Instability Analysis: A Comparison of Available Techniques—G. G. CHELL AND I. MILNE</b>	II-179
<b>Validation of a Deformation Plasticity Failure Assessment Diagram Approach to Flaw Evaluation—J. M. BLOOM</b>	II-206

<b>Studies on the Failure Assessment Diagram Using the Estimation Method and <math>J</math>-Controlled Crack Growth Approach— C. F. SHIH, V. KUMAR, AND M. D. GERMAN</b>	II-239
<b>Lower-Bound Solutions and Their Application to the Collapse Load of a Cracked Member Under Axial Force and Bending Moment— H. OKAMURA, K. KAGEYAMA, AND Y. TAKAHATA</b>	II-262
<b>Ductile Crack Growth Analysis Within the Ductile-Brittle Transition Regime: Predicting the Permissible Extent of Ductile Crack Growth— I. MILNE AND D. A. CURRY</b>	II-278
<b>Ductile Fracture of Circumferentially Cracked Pipes Subjected to Bending Loads— A. ZAHOOR AND M. F. KANNINEN</b>	II-291
<b>Engineering Methods for the Assessment of Ductile Fracture Margin in Nuclear Power Plant Piping— S. RANGANATH AND H. S. MEHTA</b>	II-309
<b>Fracture of Circumferentially Cracked Type 304 Stainless Steel Pipes Under Dynamic Loading— G. M. WILKOWSKI, J. AHMAD, A. ZAHOOR, C. W. MARSHALL, D. BROEK, I. S. ABOU-SAYED, AND M. F. KANNINEN</b>	II-331
<b>TEST METHODS AND GEOMETRY EFFECTS</b>	
<b><math>J_R</math>-Curve Testing of Large Compact Specimens— D. E. McCABE AND J. D. LANDES</b>	II-353
<b>On the Unloading Compliance Method of Deriving Single-Specimen R-Curves in Three-Point Bending— A. A. WILLOUGHBY AND S. J. GARWOOD</b>	II-372
<b>Evaluation of Several <math>J_{Ic}</math> Testing Procedures Recommended in Japan— K. OHJI, A. OTSUKA, AND H. KOBAYASHI</b>	II-398
<b>Evaluation of Blunting Line and Elastic-Plastic Fracture Toughness— H. KOBAYASHI, H. NAKAMURA, AND H. NAKAZAWA</b>	II-420
<b>Instability Testing of Compact and Pipe Specimens Utilizing a Test System Made Compliant by Computer Control— J. A. JOYCE</b>	II-439

**Computer-Controlled Single-Specimen J-Test—W. A. VAN DER SLUYS**

AND R. J. FUTATO

II-464

**Quantitative Fractographic Definition and Detection of Fracture**

**Initiation in COD/ $K_{Ic}$  Test Specimens—S. M. EL-SOUDANI**

AND J. F. KNOTT

II-483

**Combined Elastic-Plastic and Acoustic Emission Methods for the**

**Evaluation of Tearing and Cleavage Crack Extension—**

**M. A. KHAN, T. SHOJI, H. TAKAHASHI, AND H. NIITSUMA**

II-506

**An Analysis of Elastic-Plastic Fracture Toughness Behavior for  $J_{Ic}$**

**Measurement in the Transition Region—T. IWADATE,**

**Y. TANAKA, S.-I. ONO, AND J. WATANABE**

II-531

**An Evaluation of the  $J_R$ -Curve Method for Fracture Toughness**

**Characterization—D. E. McCABE, J. D. LANDES,**

**AND H. A. ERNST**

II-562

**Specimen Geometry and Extended Crack Growth Effects on  $J_I$ -R**

**Curve Characteristics for HY-130 and ASTM A533B Steels—**

**D. A. DAVIS, M. G. VASSILAROS, AND J. P. GUDAS**

II-582

**An Elastic-Plastic Fracture Mechanics Study of Crack Initiation in**

**316 Stainless Steel—P. H. DAVIES**

II-611

**Thickness Effects on the Choice of Fracture Criteria—H.-W. LIU,**

**W.-L. HU, AND A. S. KUO**

II-632

**Experimental Validation of Resistance Curve Analysis—I. MILNE**

II-657

**CYCLIC PLASTICITY EFFECTS AND MATERIAL CHARACTERIZATION**

**Elastic-Plastic Fracture Mechanics Analysis of Fatigue Crack**

**Growth—M. H. EL HADDAD AND B. MUKHERJEE**

II-689

**Elastic-Plastic Crack Propagation Under High Cyclic Stresses—**

**K. TANAKA, T. HOSHIDE, AND M. NAKATA**

II-708

**Load History Effects on the  $J_R$ -Curve—J. D. LANDES AND**

**D. E. McCABE**

II-723

<b>Micromechanisms of Ductile Stable Crack Growth in Nuclear Pressure Vessel Steels</b> —W. P. A. BELCHER AND S. G. DRUCE	II-739
<b>Ductile Fracture with Serrations in AISI 310S Stainless Steel at Liquid Helium Temperature</b> —R. L. TOBLER	II-763
<b>J-R Curve Characterization of Irradiated Low-Shelf Nuclear Vessel Steels</b> —F. J. LOSS, B. H. MENKE, A. L. HISER, AND H. E. WATSON	II-777
<b>Initiation of Fatigue Cracks Around Inclusions in Rolling Fatigue</b> —M. FREITAS AND D. FRANCOIS	II-796
<b>Index</b>	II-809