AGARD REPORT 797

An Assessment of Fatigue Damage and Crack Growth Prediction Techniques

(L'Evaluation de l'Endommagement en Fatigue et les Techniques de Prédiction de la Propagation des Fissures)

Papers presented at the 77th Meeting of the AGARD Structures and Materials Panel, held in Bordeaux, France 29th–30th September 1993.
## Contents

<table>
<thead>
<tr>
<th>Preface/Préface</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structures and Materials Panel</td>
<td>iv</td>
</tr>
</tbody>
</table>

Reference

<table>
<thead>
<tr>
<th>Technical Evaluation Report</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>by T. Swift</td>
<td>T</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lead Paper: Overview of the Structural Integrity Process</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>by J.W. Lincoln</td>
<td>LP</td>
</tr>
</tbody>
</table>

### SESSION I — MEASUREMENTS AND PREDICTIVE METHODOLOGIES

<table>
<thead>
<tr>
<th>Paper</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miner's Rule Revisited</td>
<td>1</td>
</tr>
<tr>
<td>by W. Schütz and P. Heuler</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fatigue Life and Crack Growth Prediction Methodology</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>by J.C. Newman, Jr, E.P. Phillips and R.A. Everett, Jr</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crack Growth Predictions using a Crack Closure Model</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>by R.L. Hewitt and P.G. Collins</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paper 4 withdrawn</th>
<th>4</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>The Crack Severity Index of Monitored Load Spectra</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>by J.B. de Jonge</td>
<td></td>
</tr>
</tbody>
</table>

### SESSION II — MEASUREMENTS AND PREDICTIVE METHODOLOGIES

<table>
<thead>
<tr>
<th>Paper</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>An Assessment of Fatigue Crack Growth Prediction Models for Aerospace Structures</td>
<td>6</td>
</tr>
<tr>
<td>by A. Salvetti, L. Lazzeri and A. Pieracci</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A Combined Approach to Buffet Response Analyses and Fatigue Life Prediction</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>by J.H. Jacobs and R. Perez</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Paper 8 withdrawn</th>
<th>8</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Notch Fatigue Assessment of Aircraft Components using a Fracture Mechanics Based Parameter</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>by Chr. Boller and M. Buderath, P. Heuler and M. Vormwald</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Growth of Artificially and Naturally Initiating Notch Root Cracks under FALSTAFF Spectrum Loading</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>by R. Sunder, R.V. Prakash and E.I. Mitchenko</td>
<td></td>
</tr>
</tbody>
</table>

### SESSION III — DESIGN EXPERIENCES

<table>
<thead>
<tr>
<th>Paper</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotorcraft Fatigue Life-Prediction: Past, Present and Future</td>
<td>11</td>
</tr>
<tr>
<td>by R.A. Everett Jr, and W. Elber</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fatigue Management and Verification of Airframes</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>by A.F. Blom and H. Ansell</td>
<td></td>
</tr>
</tbody>
</table>
Risk Analysis of the C-141 WS405 Inner-to-Outer Wing Joint
by R.E. Alford, R.P. Bell, J.B. Cochran and D.O. Hammond

Assessment of In-Service Aircraft Fatigue Monitoring Process
by R.J. Cazes

The Role of Fatigue Analysis for Design of Military Aircraft
by R. Bochmann and D. Weisgerber

SESSION IV — DESIGN EXPERIENCES

Damage Tolerance Management of the X-29 Vertical Tail
by J. Harter

Harrier II: A Comparison of US and UK Approaches to Fatigue Clearance
by F.S. Perry

Fatigue Design, Test and In-Service Experience of the BAe Hawk
by J. O'Hara

Reduction of Fatigue Load Experience as Part of the Fatigue Management Program for
F-16 Aircraft of the RNLAF
by D.J. Spiekhout

An Overview of the F-16 Service Life Approach
by J. Morrow and G.T. Herrick