

# TABLE OF CONTENTS

<u>PREFACE AND ACKNOWLEDGEMENTS</u>	xi
<u>WORKSHOP PHOTOGRAPH</u>	xiv
IDENTIFICATION IN PHOTOGRAPH	xv
<u>LIST OF PARTICIPANTS</u>	xvii
 <u>WORKSHOP PAPERS</u>	
<u>1. OVERVIEW</u>	
'Neutron Diffraction Measurement of Residual Stress Fields: Overview and Points for Discussion' M T HUTCHINGS	3
 <u>2. BACKGROUND</u>	
'Role of Neutron Diffraction in Engineering Stress Analysis' G A WEBSTER	21
'Applications of X-ray Residual Stress Measurements in Industrial R&D' M R JAMES	37
'The Theory of Stress/Strain Analysis with Diffraction' I C NOYAN	51
'The Calculation of Residual Stress' S SJÖSTRÖM	67
'Comparison Between Finite Element Calculations and Neutron Diffraction Measurements of Residual Stress in a Diametrically Compressed Ring' T M HOLDEN, R R HOSBONS, S R MacEWEN, E C FLOWER, M A BOURKE and J A GOLDSTONE	93

### 3. ASPECTS OF FUNDAMENTAL PRINCIPLES

'Macrostress, Microstress and Stress Tensors' L PINTSCHOVUS	115
'Separation of Microstress and Macrostress' R A WINHOLTZ	131
'The Effects of Crystalline Anisotropy on the Elastic Response of Materials' <u>C G WINDSOR</u> and T IZUYAMA	147
'Investigation of Large Grained Samples - Principles' W REIMERS	159
'The Plastic Regime, Including Anisotropy Effects' <u>T LEFFERS</u> and T LORENTZEN	171
'Grain Interaction Stresses' L PINTSCHOVUS	189
'Relaxation' P J WITHERS	205
'Interpretation of Residual Stress Measurements: Summary of Discussion Session' T M HOLDEN and A W BOWEN	223

### 4. ASPECTS OF EXPERIMENTAL MEASUREMENT

'Spatial Resolution and Strain Scanning' P J WEBSTER	235
'Strain Tensor Measurements by Neutron Diffraction' <u>T LORENTZEN</u> and T LEFFERS	253
'Investigations of Large Grained Samples - Examples' <u>W REIMERS</u> , H -A CROSTACK, M WROBLE and G ECKOLD	263
'The Stress-Free Reference Sample: Alloy Composition Information from Neutron Capture' H G PRIESMEYER	277
'The Precision of Peak Position Determination in Diffraction Measurements of Stress' C G WINDSOR      ( Paper arising from discussions at Workshop)	285

'Errors in Analysis'	297
A J ALLEN (Abstract only)	

## 5. INSTRUMENTATION

### 5a INSTRUMENTATION : STEADY STATE REACTOR

'Optimised Geometry for a Stress Measurement Two-Axis Diffractometer at a Reactor'	301
F M A MARGAÇA	
'Implementation and Application of a PSD Set-up for Neutron Diffraction Strain Measurements'	313
<u>T LORENTZEN</u> , T LEFFERS and D JUUL JENSEN	
'Reverse Time-of-Flight Fourier Technique for Strain Measurements'	329
H G PRIESMEYER	
'The Alignment of Instrumentation and the Positioning of Specimens for Stress Measurements by Means of Neutron Diffraction'+	335
P C BRAND	
'Proposal for a Neutron Strain Measurement Apparatus'+	347
M KOCSIS and J KULDA	
'Microbeam Techniques in Diffraction: A Theoretical Treatment'	353
I C NOYAN (Abstract only)	
'Summary of the Panel Discussion on Instrumentation at Steady State Sources'	355
T LORENTZEN and P C BRAND	

### 5b INSTRUMENTATION : PULSED NEUTRON SOURCE

'Residual and Applied Stress Measurements at IPNS'	363
J W RICHARDSON, JR.	
'Residual Stress Measurement using the Pulsed Neutron Source at LANSCE'	369
M A M BOURKE, <u>J A GOLDSTONE</u> and T M HOLDEN	
'Stress Measurement: Experience at ISIS'	383
<u>S HULL</u> , W I F DAVID and M W JOHNSON	
'Transmission Bragg-Edge Measurements'	389
H G PRIESMEYER	

'MACS, The Manipulation and Collimation System on the NPD at LANSCE'+ M A M BOURKE, J A GOLDSTONE AND K J LOVELL.	395
--	-----

'The Design of a Pulsed Source Instrument: Summary of Discussion Session' S HULL	401
---	-----

## 6. COMPOSITES

'Stress Measurements in Composites using Neutron Diffraction' A D KRAWITZ	405
--	-----

'Theory and Modelling of Composites' P J WITHERS	421
---	-----

'Application of Neutron Diffraction Time-of-Flight Measurements to the Study of Strain in Composites' D S KUPPERMAN, S MAJUMDAR, J P SINGH and A SAIGAL ( Presented by <u>J W RICHARDSON JR.</u> )	439
---	-----

'Deformation Analysis in Mixed Composites' U SELVADURAI-LASSL, H -A CROSTACK, <u>W REIMERS</u> , T VOGT and G ECKOLD	451
--	-----

'Surface and Near-Surface Analysis of Residual Stresses in Aluminium and Titanium Alloys - Examples of the Case for X-ray Diffraction' P HOLDWAY and <u>A W BOWEN</u>	461
---	-----

'Residual Stresses in Brazed Ceramic-Metal Compounds' L PINTSCHOVIVUS, N PYKA, R KUSSMAUL, D MUNZ, B EIGENMANN and B SCHOLTES ( Presented by <u>W REIMERS</u> )	473
---	-----

## 7. MEASUREMENTS ON BULK COMPONENTS

'Residual Stress Distribution in Cracked Autofrettaged Tubing' <u>M A M BOURKE</u> , H J MacGILLIVRAY, G A WEBSTER and P J WEBSTER	481
---	-----

'Measurement of Stresses in Metal Adhesive Joints' <u>A LODINI</u> , J LI, M PERRIN, F DUNSTETTER and L RIMLINGER	493
--	-----

'Residual Stress Measurements in Armament-Related Components' <u>H J PRASK</u> and C S CHOI	503
--	-----

'Problems with Railway Rails'+ P J WEBSTER, X WANG and G MILLS	517
---	-----

'Neutron Measurements of Residual Strain in some Technological Materials and Components'+ G ALBERTINI, M CERETTI, R COPPOLA, A LODINI, M PERRIN and F RUSTICHELLI	525
'Development of the Neutron Diffraction Technique for the Determination of Near Surface Residual Stresses in Critical Gas Turbine Components'+ A N EZEILO, P S WEBSTER, G A WEBSTER and P J WEBSTER	535
'Residual Stresses at Cold Expanded Fastener Holes'+ L EDWARDS AND A T OZDEMIR	545
'Neutron and X-ray Diffraction Residual Stress Measurements on Power Generator Turbine Blades: Comparison with Finite Element Analysis' <u>M KIJEK</u> , T R FINLAYSON and R L DAVIS ( Abstract only)	555

## **8. COMPARISON OF NEUTRONS WITH X-RAYS AND OTHER STRESS PROBES**

'Calibration of Portable NDE Techniques for Residual Stress Measurement' A J ALLEN	559
'Triaxial Analysis of Residual Stress Fields in Metallic Plates'+ L CASTEX and J BARRALIS ( Abstract only)	573
'Pitfalls of Layer Removal Techniques in X-ray Residual Stress Measurements' M JAMES ( Abstract only)	575
'Neutrons Versus X-rays' L PINTSCHOVIOUS	577

INDEX	581
(Authors, Subjects)	

**Note:** Speaker is Underlined in multi-author papers.  
+denotes Poster Paper.