

Contents

<i>List of contributors</i>	vii
<i>Preface</i>	ix
<i>Acknowledgements</i>	xli

PART 1

General applications of neutron and synchrotron radiation to materials research	1
---	---

1 The use of neutrons for materials characterization	3
--	---

C. H. DE NOVION

2 The use of synchrotron radiation for materials research	28
---	----

C. RIEKEL

PART 2

Methods and problems in residual stress determination by diffraction	45
--	----

3 Calculation of residual stress from measured strain	47
---	----

A. LODINI

4 Characterization of macro stresses	60
--------------------------------------	----

R. A. WINHOLTZ

5 Study of second- and third-order stresses	78
---	----

J. M. SPRAUEL

6 The effect of texture on residual stress measurement and interpretation	97
---	----

T. M. HOLDEN

7 Anisotropy of lattice strain response	114
---	-----

T. LORENTZEN

PART 3

Measurement techniques

8 Neutron diffraction using a constant wavelength

L. PINTSCHOVIOUS

9 Neutron pulsed source instrumentation

M. W. JOHNSON AND M. R. DAYMOND

10 Use of synchrotron X-ray radiation for stress measurement

P. J. WITHERS

11 The use of neutron transmission for materials analysis

H.-G. PRIESMEYER

PART 4

Areas of study

12 Strain mapping

P. J. WEBSTER

13 Study of stress gradients using synchrotron X-ray diffraction

A. PYZALLA AND W. REIMERS

14 Near-surface stress measurement using neutron diffraction

L. EDWARDS

PART 5

Applications

15 Shot peening

A. EZEILO

16 Composite materials

M. E. FITZPATRICK

17 Residual stress analysis in monocrystals using capillary optics

W. REIMERS AND D. MOLLER

18 Neutron residual stress measurement in welds

S. SPOONER

19 Materials for nuclear fusion applications

R. COPPOLA AND C. NARDI

20 Residual stresses in ceramic materials

R. I. TODD

Index