

Applied Condition Monitoring

Nikolai K. Myshkin  
Liubou V. Markova

# On-line Condition Monitoring in Industrial Lubrication and Tribology

 Springer

Nikolai K. Myshkin  
Tribology Department, V.A. Belyi  
Metal-Polymer Research Institute  
Belarus National Academy of Sciences  
Gomel  
Belarus

Liubou V. Markova  
Belarus National Technical University  
Minsk  
Belarus

ISSN 2363-698X  
Applied Condition Monitoring  
ISBN 978-3-319-61133-4  
DOI 10.1007/978-3-319-61134-1

ISSN 2363-6998 (electronic)  
ISBN 978-3-319-61134-1 (eBook)

Library of Congress Control Number: 2017945713

© Springer International Publishing AG 2018

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, express or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Printed on acid-free paper

This Springer imprint is published by Springer Nature  
The registered company is Springer International Publishing AG  
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland



# Contents

<b>1</b>	<b>Methods and Instruments for Condition Monitoring of Lubricants</b> . . . . .	1
1.1	Introduction . . . . .	1
1.2	Laboratory Methods of Oil Monitoring . . . . .	2
1.3	Methods and Means for Real-Time Monitoring Lubricant Performance . . . . .	3
1.4	Fluorescence Methods and Tools for Real-Time Oil Oxidation Monitoring . . . . .	12
1.5	Fluorescence Emission Ratio Technique and Sensor for On-Board Application . . . . .	17
1.5.1	Application of the Fluorescent Sensor for Hydraulic Oil Condition Monitoring . . . . .	21
1.5.2	Application of Fluorescence Emission Ratio Technique for Transformer Oil Monitoring . . . . .	22
1.6	Conclusions . . . . .	27
	References . . . . .	28
<b>2</b>	<b>Oil Viscosity Monitoring</b> . . . . .	31
2.1	Introduction . . . . .	31
2.2	Oil Viscosity Characterization . . . . .	31
2.3	Laboratory Measurements of Viscosity . . . . .	33
2.4	Methods of On-Line Viscosity Monitoring . . . . .	35
2.5	Viscosity Sensor Based on Magneto-Elasticity . . . . .	44
2.5.1	Magnetoelastic Viscometry Technique . . . . .	44
2.5.2	Magnetoelastic Viscometer . . . . .	48
2.5.3	Experimental Results . . . . .	52
2.6	Conclusions . . . . .	57
	References . . . . .	58

