

A VISION FOR DYNAMICS IN THE 21ST CENTURY

A large international conference celebrated the 50-year career of Anatole Katok and the body of research across smooth dynamics and ergodic theory that he touched. In this book many leading experts provide an account of the latest developments at the research frontier and together set an agenda for future work, including an explicit problem list. This includes elliptic, parabolic, and hyperbolic smooth dynamics, ergodic theory, smooth ergodic theory, and actions of higher-rank groups. The chapters are written in a readable style and give a broad view of each topic; they blend the most current results with the developments leading up to them and give a perspective on future work. This book is ideal for graduate students, instructors, and researchers across all research areas in dynamical systems and related subjects.

DANIJELA DAMJANOVIĆ is an Associate Professor at the Royal Institute of Technology (KTH), Sweden. She received her PhD in mathematics from Pennsylvania State University, USA in 2004. Her research is in the area of dynamics of smooth group actions. She serves on the editorial board of *Journal of Modern Dynamics*.

BORIS HASSELBLATT is a Professor at Tufts University, USA. He received his PhD from California Institute of Technology in 1989. He serves on the editorial board of *Journal of Modern Dynamics* and is a co-author of several books in the field of smooth dynamical systems, notably *Introduction to the Modern Theory of Dynamical Systems*. He is also (co-)editor of several large volumes, *Handbook of Dynamical Systems*, 1A and 1B, and *The Collected Works of Anatole Katok*, Volumes 1 and 2. He is Fellow and the Secretary of the American Mathematical Society.

ANDREY GOGOLEV is a Professor of Mathematics at The Ohio State University, USA. He received his PhD from Pennsylvania State University in 2009. His primary research interest is smooth dynamics with hyperbolic behavior. He serves on the editorial board of *Journal of Modern Dynamics*.

YAKOV PESIN is Distinguished Professor of Mathematics at Pennsylvania State University, USA. He is director of the Anatole Katok Center for Dynamical Systems and Geometry, a member of the European Academy (Academia Europea) and the American Academy of Arts and Sciences, a Fellow of the American Mathematical Society, and an editor of the journal *Ergodic Theory and Dynamical Systems*. He received his PhD in mathematics from Gorky State University in 1979. He has (co)authored six books covering smooth dynamics, ergodic theory, dimension theory, and fractal geometry, and a dozen surveys on these topics.

A VISION FOR DYNAMICS IN THE 21ST CENTURY

The Legacy of Anatole Katok

Edited by

DANIJELA DAMJANOVIĆ

KTH Royal Institute of Technology

BORIS HASSELBLATT

Tufts University

ANDREY GOGOLEV

The Ohio State University

YAKOV PESIN

Pennsylvania State University



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press & Assessment
978-1-009-27890-4 — A Vision for Dynamics in the 21st Century
Danijela Damjanovic , Boris Hasselblatt , Andrey Gogolev , Yakov Pesin
Frontmatter
[More Information](#)



Shaftesbury Road, Cambridge CB2 8EA, United Kingdom
One Liberty Plaza, 20th Floor, New York, NY 10006, USA
477 Williamstown Road, Port Melbourne, VIC 3207, Australia
314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre,
New Delhi – 110025, India
103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment,
a department of the University of Cambridge.

We share the University's mission to contribute to society through the pursuit of
education, learning and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781009278904
DOI: 10.1017/9781009278898

© Cambridge University Press & Assessment 2024

This publication is in copyright. Subject to statutory exception and to the provisions
of relevant collective licensing agreements, no reproduction of any part may take
place without the written permission of Cambridge University Press & Assessment.

First published 2024

A catalogue record for this publication is available from the British Library.

A Cataloging-in-Publication data record for this book is available from the Library of Congress

ISBN 978-1-009-27890-4 Hardback

Cambridge University Press & Assessment has no responsibility for the persistence
or accuracy of URLs for external or third-party internet websites referred to in this
publication and does not guarantee that any content on such websites is, or will remain,
accurate or appropriate.

Contents

<i>Editor’s Note</i>	page vii
<i>List of Contributors</i>	viii
1 Open Problems from 2020 Vision for Dynamics Conference in Będlewo ADAM ABRAMS, JAIRO BOCHI, AND DANIJELA DAMJANOVIĆ	1
2 Rigidity of Topological Entropy of Boundary Maps Associated to Fuchsian Groups ADAM ABRAMS, SVETLANA KATOK, AND ILIE UGARCOVICI	19
3 Flexibility of Entropies for Piecewise Expanding Unimodal Maps LLUÍS ALSEDÀ, MICHAŁ MISIUREWICZ, AND RODRIGO A. PÉREZ	48
4 Recent Results and Open Questions on Pseudo-Rotations BARNEY BRAMHAM AND ZHIYUAN ZHANG	67
5 SRB and Equilibrium Measures via Dimension Theory VAUGHN CLIMENHAGA	94
6 Abelian Livshits Theorems and Geometric Applications ANDREY GOGOLEV AND FEDERICO RODRIGUEZ HERTZ	139
7 A Dynamical Approach to Validated Numerics OLIVER JENKINSON AND MARK POLLICOTT	168
8 Non-stationary Normal Forms for Contracting Extensions BORIS KALININ	207

vi	<i>Contents</i>	
9	Survey on Entropy-Type Invariants of Subexponential Growth in Dynamical Systems	232
	ADAM KANIGOWSKI, ANATOLE KATOK, AND DAREN WEI	
10	On the Smooth Realization Problem and the AbC Method	290
	PHILIPP KUNDE	
11	On Some Spectral Problems in Ergodic Theory	318
	MARIUSZ LEMAŃCZYK	
12	Area-Preserving Surface Diffeomorphisms with Polynomial Decay of Correlations Are Ubiquitous	337
	YAKOV PESIN, SAMUEL SENTI, AND FARRUH SHAHIDI	
13	Linear Cocycles over Hyperbolic Systems	384
	VICTORIA SADOVSKAYA	

Cambridge University Press & Assessment

978-1-009-27890-4 — A Vision for Dynamics in the 21st Century

Danijela Damjanovic , Boris Hasselblatt , Andrey Gogolev , Yakov Pesin

Frontmatter

[More Information](#)



Editor's Note

The book cover shows the Palace of Będlewo, a conference center of the Polish Academy of Sciences where a memorial conference for the great dynamicist Anatole Katok took place in August 2019.* This conference inspired this book, and many of the authors participated. During this conference we celebrated 50 years of Katok's leadership by doing what he had always fostered: creating a connected vision of the field of dynamical systems and ergodic theory and shaping an agenda for future research. These are the aims of this book, and its chapters give direction to their respective subjects, as well as a broad view and a contemporary account. A separate problem list provides specific suggestions for investigation.

* The conference was supported by the Polish Academy of Sciences, its Banach Center, and by NSF grant DMS-1900171.

Contributors

Adam Abrams

Wroclaw University of Science and Technology

Lluís Alsedà

Autonomous University of Barcelona

Jairo Bochi

The Pennsylvania State University

Barney Bramham

Ruhr University Bochum

Vaughn Climenhaga

University of Houston

Danijela Damjanović

Royal Institute of Technology (KTH) Stockholm

Andrey Gogolev

The Ohio State University

Federico Rodriguez Hertz

The Pennsylvania State University

Oliver Jenkinson

Queen Mary University of London

List of Contributors

ix

Boris Kalinin

The Pennsylvania State University

Adam Kanigowski

University of Maryland

Anatole Katok

Late of the Pennsylvania State University

Svetlana Katok

The Pennsylvania State University

Philipp Kunde

University of Hamburg

Mariusz Lemańczyk

Nicolaus Copernicus University

Michał Misiurewicz

Indiana University-Purdue University Indianapolis

Rodrigo A. Pérez

Indiana University-Purdue University Indianapolis

Yakov Pesin

The Pennsylvania State University

Mark Pollicott

University of Warwick

Victoria Sadovskaya

The Pennsylvania State University

Samuel Senti

Federal University of Rio de Janeiro

Farruh Shahidi

Siemens Digital Industries Software

Cambridge University Press & Assessment
978-1-009-27890-4 — A Vision for Dynamics in the 21st Century
Danijela Damjanovic , Boris Hasselblatt , Andrey Gogolev , Yakov Pesin
Frontmatter
[More Information](#)

x *List of Contributors*

Ilie Ugarcovici
DePaul University

Daren Wei
National University of Singapore

Zhiyuan Zhang
Sorbonne Paris North University