S E
M M
E S

Zurich Lectures in Advanced Mathematics

Edited by

Erwin Bolthausen (Managing Editor), Freddy Delbaen, Thomas Kappeler (Managing Editor), Christoph Schwab, Michael Struwe, Gisbert Wüstholz

Mathematics in Zurich has a long and distinguished tradition, in which the writing of lecture notes volumes and research monographs plays a prominent part. The *Zurich Lectures in Advanced Mathematics* series aims to make some of these publications better known to a wider audience. The series has three main constituents: lecture notes on advanced topics given by internationally renowned experts, graduate text books designed for the joint graduate program in Mathematics of the ETH and the University of Zurich, as well as contributions from researchers in residence at the mathematics research institute, FIM-ETH. Moderately priced, concise and lively in style, the volumes of this series will appeal to researchers and students alike, who seek an informed introduction to important areas of current research.

Previously published in this series:

Yakov B. Pesin, *Lectures on partial hyperbolicity and stable ergodicity*
Sun-Yung Alice Chang, *Non-linear Elliptic Equations in Conformal Geometry*
Sergei B. Kuksin, *Randomly forced nonlinear PDEs and statistical hydrodynamics in 2 space dimensions*
Pavel Etingof, *Calogero-Moser systems and representation theory*
Guus Balkema and Paul Embrechts, *High Risk Scenarios and Extremes – A geometric approach*
Demetrios Christodoulou, *Mathematical Problems of General Relativity I*
Camillo De Lellis, *Rectifiable Sets, Densities and Tangent Measures*
Paul Seidel, *Fukaya Categories and Picard–Lefschetz Theory*
Alexander H.W. Schmitt, *Geometric Invariant Theory and Decorated Principal Bundles*
Michael Farber, *Invitation to Topological Robotics*
Alexander Barvinok, *Integer Points in Polyhedra*
Christian Lubich, *From Quantum to Classical Molecular Dynamics: Reduced Models and Numerical Analysis*
Shmuel Onn, *Nonlinear Discrete Optimization – An Algorithmic Theory*
Kenji Nakanishi and Wilhelm Schlag, *Invariant Manifolds and Dispersive Hamiltonian Evolution Equations*
Erwan Faou, *Geometric Numerical Integration and Schrödinger Equations*
Alain-Sol Sznitman, *Topics in Occupation Times and Gaussian Free Fields*
François Labourie, *Lectures on Representations of Surface Groups*
Isabelle Gallagher, Laure Saint-Raymond and Benjamin Texier, *From Newton to Boltzmann: Hard Spheres and Short-range Potentials*

Published with the support of the Huber-Kudlich-Stiftung, Zürich

Robert J. Marsh

Lecture Notes on Cluster Algebras

European Mathematical Society

Author:

Robert J. Marsh
School of Mathematics
University of Leeds
Leeds LS2 9JT
United Kingdom

E-mail: R.J.Marsh@leeds.ac.uk

2010 Mathematics Subject Classification (Primary; secondary): 13F60; 05E40, 14M15, 17B22, 17B63, 18E30, 20F55, 51F15, 52B05, 52B11, 57Q15

Key words: associahedron, cluster algebra, cluster complex, Dynkin diagram, finite mutation type, Grassmannian, Laurent phenomenon, reflection group, periodicity, polytope, quiver mutation, root system, Somos sequence, surface

ISBN 978-3-03719-130-9

The Swiss National Library lists this publication in The Swiss Book, the Swiss national bibliography, and the detailed bibliographic data are available on the Internet at http://www.helveticat.ch.

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in other ways, and storage in data banks. For any kind of use permission of the copyright owner must be obtained.

© 2013 European Mathematical Society

Contact address:

European Mathematical Society Publishing House
Seminar for Applied Mathematics
ETH-Zentrum SEW A27
CH-8092 Zürich
Switzerland

Phone: +41 (0)44 632 34 36
Email: info@ems-ph.org
Homepage: www.ems-ph.org

Typeset using the author's TEX files: le-tex publishing services GmbH, Leipzig, Germany
Printing and binding: Beltz Bad Langensalza GmbH, Bad Langensalza, Germany
∞ Printed on acid free paper
9 8 7 6 5 4 3 2 1