

SpringerBriefs in Mathematics

Series Editors

Nicola Bellomo

Michele Benzi

Palle Jorgensen

Tatsien Li

Roderick Melnik

Otmar Scherzer

Benjamin Steinberg

Lothar Reichel

Yuri Tschinkel

George Yin

Ping Zhang

SpringerBriefs in Mathematics showcases expositions in all areas of mathematics and applied mathematics. Manuscripts presenting new results or a single new result in a classical field, new field, or an emerging topic, applications, or bridges between new results and already published works, are encouraged. The series is intended for mathematicians and applied mathematicians.

More information about this series at <http://www.springer.com/series/10030>

Eli Levin • Doron S. Lubinsky*

Bounds and Asymptotics for Orthogonal Polynomials for Varying Weights

 Springer

* Research supported by NSF grant DMS136208

Eli Levin
Department of Mathematics
Open University of Israel
Tel-Aviv, Israel

Doron S. Lubinsky
Mathematics
Georgia Institution of Technology
Atlanta, Georgia, USA

ISSN 2191-8198 ISSN 2191-8201 (electronic)
SpringerBriefs in Mathematics
ISBN 978-3-319-72946-6 ISBN 978-3-319-72947-3 (eBook)
<https://doi.org/10.1007/978-3-319-72947-3>

Library of Congress Control Number: 2017963056

Mathematics Subject Classification: 42C05, 41A17, 30C15, 30E15, 31A15

© The Author(s) 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

Acknowledgement

The authors thank Annette Rohrs for her meticulous care in preparing the manuscript, and Danielle Walker and Donna Chernyk for their prompt and efficient handling of the process.

Contents

1	Introduction	1
2	Statement of Main Results	9
3	Potential Theoretic Estimates	13
4	Restricted Range Inequalities	29
5	Bounds for Christoffel Functions	37
6	Spacing of Zeros	47
7	Bounds on Orthogonal Polynomials	53
8	Markov-Bernstein Inequalities in L_∞	63
9	Discretization of Potentials	67
10	Derivatives of Discretized Polynomials	83
11	Weighted Polynomial Approximations	93
12	Formulae Involving Bernstein-Szegő Polynomials	117
13	Asymptotics of Orthonormal Polynomials	123
14	Further Bounds	143
15	Universality Limits and Entropy Integrals	153
	References	165
	Index	169