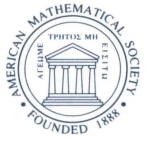
CONTEMPORARY MATHEMATICS

189

Harmonic Analysis and Operator Theory

A Conference in Honor of Mischa Cotlar
January 3–8, 1994
Caracas, Venezuela

S. A. M. Marcantognini
G. A. Mendoza
M. D. Morán
A. Octavio
W. O. Urbina
Editors



American Mathematical Society

http://dx.doi.org/10.1090/conm/189

Other Titles in This Series

189 **S. A. M. Marcantognini, G. A. Mendoza, M. D. Morán, A. Octavio, and W. O. Urbina, Editors,** Harmonic analysis and operator theory, 1995

188 **Alejandro Adem, R. James Milgram, and Douglas C. Ravenel, Editors,** Homotopy theory and its applications, 1995

187 **G. W. Brumfiel and H. M. Hilden,** $SL(2)$ representations of finitely presented groups, 1995

186 **Shreeram S. Abhyankar, Walter Feit, Michael D. Fried, Yasutaka Ihara, and Helmut Voelklein, Editors,** Recent developments in the inverse Galois problem, 1995

185 **Raúl E. Curto, Ronald G. Douglas, Joel D. Pincus, and Norberto Salinas, Editors,** Multivariable operator theory, 1995

184 **L. A. Bokut', A. I. Kostrikin, and S. S. Kutateladze, Editors,** Second International Conference on Algebra, 1995

183 **William C. Connett, Marc-Olivier Gebuhrer, and Alan L. Schwartz, Editors,** Applications of hypergroups and related measure algebras, 1995

182 **Selman Akbulut, Editor,** Real algebraic geometry and topology, 1995

181 **Mila Cenkl and Haynes Miller, Editors,** The Čech Centennial, 1995

180 **David E. Keyes and Jinchao Xu, Editors,** Domain decomposition methods in scientific and engineering computing, 1994

179 **Yoshiaki Maeda, Hideki Omoro, and Alan Weinstein, Editors,** Symplectic geometry and quantization, 1994

178 **Hélène Barcelo and Gil Kalai, Editors,** Jerusalem Combinatorics '93, 1994

177 **Simon Gindikin, Roe Goodman, Frederick P. Greenleaf, and Paul J. Sally, Jr., Editors,** Representation theory and analysis on homogeneous spaces, 1994

176 **David Ballard,** Foundational aspects of "non"standard mathematics, 1994

175 **Paul J. Sally, Jr., Moshe Flato, James Lepowsky, Nicolai Reshetikhin, and Gregg J. Zuckerman, Editors,** Mathematical aspects of conformal and topological field theories and quantum groups, 1994

174 **Nancy Childress and John W. Jones, Editors,** Arithmetic geometry, 1994

173 **Robert Brooks, Carolyn Gordon, and Peter Perry, Editors,** Geometry of the spectrum, 1994

172 **Peter E. Kloeden and Kenneth J. Palmer, Editors,** Chaotic numerics, 1994

171 **Rüdiger Göbel, Paul Hill, and Wolfgang Liebert, Editors,** Abelian group theory and related topics, 1994

170 **John K. Beem and Krishan L. Duggal, Editors,** Differential geometry and mathematical physics, 1994

169 **William Abikoff, Joan S. Birman, and Kathryn Kuiken, Editors,** The mathematical legacy of Wilhelm Magnus, 1994

168 **Gary L. Mullen and Peter Jau-Shyong Shiue, Editors,** Finite fields: Theory, applications, and algorithms, 1994

167 **Robert S. Doran, Editor,** C^*-algebras: 1943–1993, 1994

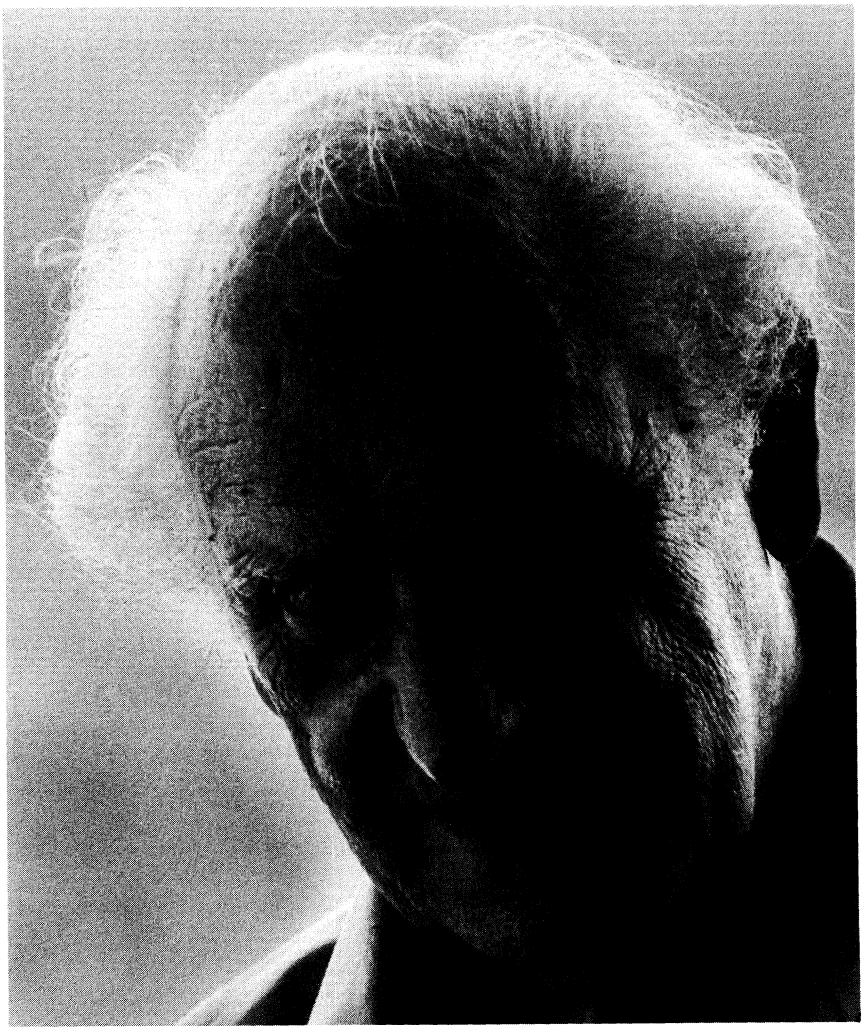
166 **George E. Andrews, David M. Bressoud, and L. Alayne Parson, Editors,** The Rademacher legacy to mathematics, 1994

165 **Barry Mazur and Glenn Stevens, Editors,** p-adic monodromy and the Birch and Swinnerton-Dyer conjecture, 1994

164 **Cameron Gordon, Yoav Moriah, and Bronislaw Wajnryb, Editors,** Geometric topology, 1994

163 **Zhong-Ci Shi and Chung-Chun Yang, Editors,** Computational mathematics in China, 1994

(*Continued in the back of this publication*)



Mischa Cotlar

Harmonic Analysis and Operator Theory

CONTEMPORARY MATHEMATICS

189

Harmonic Analysis and Operator Theory

A Conference in Honor of Mischa Cotlar
January 3–8, 1994
Caracas, Venezuela

S. A. M. Marcantognini
G. A. Mendoza
M. D. Morán
A. Octavio
W. O. Urbina
Editors

American Mathematical Society
Providence, Rhode Island

Editorial Board

Craig Huneke, managing editor

Clark Robinson
Linda Preiss Rothschild
J. T. Stafford
Peter M. Winkler

The International Conference on Harmonic Analysis and Operator Theory in Honor of Mischa Cotlar was held in Caracas, Venezuela, from January 3–8, 1994, with support from CONICIT (Venezuela), Fundación Polar, Congreso Nacional de Venezuela, Universidad Central de Venezuela, Universidad Simón Bolivar, Instituto Venezolano de Investigaciones Científicas, and the National Science Foundation, Grant No. NSF/INT 9309850.

1991 *Mathematics Subject Classification.* Primary 43–XX, 47–XX; Secondary 44–XX, 45–XX, 46–XX.

Library of Congress Cataloging-in-Publication Data

Harmonic analysis and operator theory : a conference in honor of Mischa Cotlar, January 3–8, 1994, Caracas, Venezuela / S. A. M. Marcantognini ... [et al.].

p. cm. — (Contemporary mathematics, ISSN 0271-4132; v. 189)

Includes bibliographical references.

ISBN 0-8218-0304-2

1. Harmonic analysis—Congresses. 2. Operator theory—Congresses. I. Cotlar, Mischa II. Marcantognini, S. A. M. (Stefania A. M.), 1960– . III. Series: Contemporary mathematics (American Mathematical Society); v. 189.

QA403.H224 1995

515'.724–dc20 95-23965

CIP

Copying and reprinting. Material in this book may be reproduced by any means for educational and scientific purposes without fee or permission with the exception of reproduction by services that collect fees for delivery of documents and provided that the customary acknowledgment of the source is given. This consent does not extend to other kinds of copying for general distribution, for advertising or promotional purposes, or for resale. Requests for permission for commercial use of material should be addressed to the Assistant Director of Production, American Mathematical Society, P. O. Box 6248, Providence, Rhode Island 02940-6248. Requests can also be made by e-mail to `reprint-permission@math.ams.org`.

Excluded from these provisions is material in articles for which the author holds copyright. In such cases, requests for permission to use or reprint should be addressed directly to the author(s). (Copyright ownership is indicated in the notice in the lower right-hand corner of the first page of each article.)

© Copyright 1995 by the American Mathematical Society. All rights reserved.
The American Mathematical Society retains all rights
except those granted to the United States Government.
Printed in the United States of America.

♾ The paper used in this book is acid-free and falls within the guidelines established to ensure permanence and durability.

♻ Printed on recycled paper.

This volume was printed from copy prepared by the authors.
Some of the articles in this volume were typeset by the authors using AMS-TEX or AMS-LATEX, the American Mathematical Society's TEX macro systems.

10 9 8 7 6 5 4 3 2 1 00 99 98 97 96 95

Contents

Preface xi

Nuclear Hankel matrices and orthogonal trigonometric polynomials
V. M. ADAMYAN AND S. E. NECHAYEV 1

An invariant submean value property and hyponormal Toeplitz operators
PATRICK AHERN AND ŽELJKO ČUČKOVIĆ 17

The commutator of the ergodic Hilbert transform
A. MICHAEL ALPHONSE AND SHOBHA MADAN 25

The homogeneous space of representations of a nuclear C*-algebra
E. ANDRUCHOW, G. CORACH, AND D. STOJANOFF 37

On the Nagy-Foias-Parrott commutant lifting theorem
RODRIGO AROCENA 55

Weighted Bergman projections in domains of finite type in $\mathbb{C}^2$
ALINE BONAMI AND SANDRINE GRELLIER 65

Commutators of singular integrals and fractional integrals on homogeneous spaces
MARCO BRAMANTI AND M. CRISTINA CERUTTI 81

A note on the Besov-Lipschitz and Triebel-Lizorkin spaces
H.-Q. BUI, M. PALUSZYŃSKI, AND M. TAIBLESON 95

Nonlinear superposition on spaces of analytic functions
G. A. CÁMERA 103

A version of Cotlar's lemma for L^p spaces and some applications
A. CARBERY 117

Julia operators and the Schur algorithm
GENE CHRISTNER AND JAMES ROVNYAK 135

Weighted H^p spaces for one sided maximal functions
LILIANA DE ROSA AND CARLOS SEGOVIA 161

A direct proof of a theorem of representation of multilinear operators on $\Pi C_0(T_i)$
IVAN DOBRAKOV AND T. V. PANCHAPAGESAN 185

Compact perturbations of operators on Kreĭn spaces
MICHAEL A. DRITSCHEL 201

Almost-orthogonality and weighted inequalities
JAVIER DUOANDIKOETXEA 213

On the extension of intertwining operators
CIPRIAN FOIAS 227

A new atomic decomposition for the Triebel-Lizorkin spaces
Y.-S. HAN, M. PALUSZYŃSKI, AND G. WEISS 235

Commutators of parabolic singular integrals
STEVE HOFMANN 251

Local behavior of Riemann's function
STEPHANE JAFFARD 287

On the spectra of the higher dimensional Maxwell operators on nonsmooth domains
BJÖRN JAWERTH AND MARIUS MITREA 309

Almost periodic factorization: An analogue of Chebotarev's algorithm
YURI KARLOVICH AND ILYA SPITKOVSKY 327

On the IVP for the nonlinear Schrödinger equations
CARLOS E. KENIG, GUSTAVO PONCE, AND LUIS VEGA 353

Unitary dilations of contractive representations of $H^\infty(\mathbb{D}^2)$
MAREK KOSIEK 369

Noether and normalization theories for a class of singular integral operators with Carleman shift and unbounded coefficients
V. G. KRAVCHENKO, A. B. LEBRE, G. S. LITVINCHUK, AND F. S. TEIXEIRA 373

Estimates for generalized Poisson integrals in a half space
TRINIDAD MENÁRGUEZ AND FERNANDO SORIA 387

Wavelet analysis, local Fourier analysis, and 2-microlocalization
Y. MEYER 393

The role of cancellation in interpolation theory
MARIO MILMAN AND RICHARD ROCHBERG 403

An extension of Naimark's dilation theorem to Krein spaces
FERNANDO PELAEZ 421

Approximation by analytic operator-valued functions
V. V. PELLER 431

Character sums and explicit estimates for L-functions
JUAN C. PERAL 449

On the resolvent of the dyadic paraproduct, and a nonlinear operation on RH_p weights
MARIA CRISTINA PEREYRA 461

On an analogue of the Wold decomposition for a π-semi-unitary operator and its model representation
V. A. STRAUSS 473

Maximal estimates for oscillatory integrals with concave phase
BJÖRN G. WALTHER 485

Algebras of multilinear forms on groups
GUANGHUA ZHAO AND BERTRAM M. SCHREIBER 497

Preface

Professor Mischa Cotlar arrived in Venezuela for the first time in 1971, and we have been fortunate to have him with us permanently since 1974. Throughout the years since, he has had a decisive influence in the development here of the areas of harmonic analysis and operator theory. In 1993, when Mischa celebrated his 80th birthday, his friends in Caracas, students and colleagues, decided to pay homage to this extraordinary person. The celebration crystalized as a conference on Harmonic Analysis and Operator Theory held in Caracas, January 3–8, 1994, and this volume, comprising papers submitted by a number of participants.

The organizers of the conference wish to take this opportunity to acknowledge the financial support received from CONICIT (Venezuela), Fundación Polar, Congreso Nacional de Venezuela, Universidad Central de Venezuela, Universidad Simón Bolívar, Instituto Venezolano de Investigaciones Científicas, and the U.S. National Science Foundation, and to thank the close to one hundred mathematicians who through their participation contributed to the success of the conference.

The editors of this volume wish to thank the authors for their contribution to this celebration of Mischa Cotlar, the referees for their careful scrutiny of the papers, and the AMS for providing this outlet for the volume.

Caracas, March of 1995

Other Titles in This Series

(*Continued from the front of this publication*)

162 **Ciro Ciliberto, E. Laura Livorni, and Andrew J. Sommese, Editors,** Classification of algebraic varieties, 1994

161 **Paul A. Schweitzer, S. J., Steven Hurder, Nathan Moreira dos Santos, and José Luis Arraut, Editors,** Differential topology, foliations, and group actions, 1994

160 **Niky Kamran and Peter J. Olver, Editors,** Lie algebras, cohomology, and new applications to quantum mechanics, 1994

159 **William J. Heinzer, Craig L. Huneke, and Judith D. Sally, Editors,** Commutative algebra: Syzygies, multiplicities, and birational algebra, 1994

158 **Eric M. Friedlander and Mark E. Mahowald, Editors,** Topology and representation theory, 1994

157 **Alfio Quarteroni, Jacques Periaux, Yuri A. Kuznetsov, and Olof B. Widlund, Editors,** Domain decomposition methods in science and engineering, 1994

156 **Steven R. Givant,** The structure of relation algebras generated by relativizations, 1994

155 **William B. Jacob, Tsit-Yuen Lam, and Robert O. Robson, Editors,** Recent advances in real algebraic geometry and quadratic forms, 1994

154 **Michael Eastwood, Joseph Wolf, and Roger Zierau, Editors,** The Penrose transform and analytic cohomology in representation theory, 1993

153 **Richard S. Elman, Murray M. Schacher, and V. S. Varadarajan, Editors,** Linear algebraic groups and their representations, 1993

152 **Christopher K. McCord, Editor,** Nielsen theory and dynamical systems, 1993

151 **Matatyahu Rubin,** The reconstruction of trees from their automorphism groups, 1993

150 **Carl-Friedrich Bödigheimer and Richard M. Hain, Editors,** Mapping class groups and moduli spaces of Riemann surfaces, 1993

149 **Harry Cohn, Editor,** Doeblin and modern probability, 1993

148 **Jeffrey Fox and Peter Haskell, Editors,** Index theory and operator algebras, 1993

147 **Neil Robertson and Paul Seymour, Editors,** Graph structure theory, 1993

146 **Martin C. Tangora, Editor,** Algebraic topology, 1993

145 **Jeffrey Adams, Rebecca Herb, Stephen Kudla, Jian-Shu Li, Ron Lipsman, and Jonathan Rosenberg, Editors,** Representation theory of groups and algebras, 1993

144 **Bor-Luh Lin and William B. Johnson, Editors,** Banach spaces, 1993

143 **Marvin Knopp and Mark Sheingorn, Editors,** A tribute to Emil Grosswald: Number theory and related analysis, 1993

142 **Chung-Chun Yang and Sheng Gong, Editors,** Several complex variables in China, 1993

141 **A. Y. Cheer and C. P. van Dam, Editors,** Fluid dynamics in biology, 1993

140 **Eric L. Grinberg, Editor,** Geometric analysis, 1992

139 **Vinay Deodhar, Editor,** Kazhdan-Lusztig theory and related topics, 1992

138 **Donald St. P. Richards, Editor,** Hypergeometric functions on domains of positivity, Jack polynomials, and applications, 1992

137 **Alexander Nagel and Edgar Lee Stout, Editors,** The Madison symposium on complex analysis, 1992

136 **Ron Donagi, Editor,** Curves, Jacobians, and Abelian varieties, 1992

135 **Peter Walters, Editor,** Symbolic dynamics and its applications, 1992

134 **Murray Gerstenhaber and Jim Stasheff, Editors,** Deformation theory and quantum groups with applications to mathematical physics, 1992

133 **Alan Adolphson, Steven Sperber, and Marvin Tretkoff, Editors,** p-adic methods in number theory and algebraic geometry, 1992

(See the AMS catalog for earlier titles)

Harmonic Analysis and Operator Theory

S. A. M. Marcantognini, G. A. Mendoza, M. D. Morán, A. Octavio, and W. O. Urbina, Editors

This book is a collection of papers reflecting the conference held in Caracas, Venezuela, in January 1994 in celebration of Professor Mischa Cotlar's eightieth birthday. Presenting an excellent account of recent advances in harmonic analysis and operator theory and their applications, many of the contributors are world leaders in their fields. The collection covers a broad spectrum of topics, including:

- wavelet analysis
- Haenkel operators
- multimeasure theory
- the boundary behavior of the Bergman kernel
- interpolation theory
- Cotlar's Lemma on almost orthogonality in the context of L^p spaces and more...

The range of topics in this volume promotes cross-pollination among the various fields covered. Such variety makes "Harmonic Analysis and Operator Theory" an inspiration for graduate students interested in this area of study.

ISBN 0-8218-0304-2