APPLIED MATHEMATICS and INFORMATICS

European Conference for the APPLIED MATHEMATICS and INFORMATICS

Vouliagmeni, Athens, Greece
December 29-31, 2010

ISSN: 1792-7390
ISBN: 978-960-474-260-8

APPLIED MATHEMATICS and INFORMATICS

European Conference for the APPLIED MATHEMATICS and INFORMATICS

Vouliagmeni, Athens, Greece
December 29-31, 2010

Copyright © 2010, by WSEAS Press

All the copyright of the present book belongs to the World Scientific and Engineering Academy and Society Press. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the Editor of World Scientific and Engineering Academy and Society Press.

All papers of the present volume were peer reviewed by two independent reviewers. Acceptance was granted when both reviewers' recommendations were positive.
See also: http://www.worldses.org/review/index.html

ISSN: 1792-7390
ISBN: 978-960-474-260-8

European Society for Applied Mathematics - EuroSAM

APPLIED MATHEMATICS and INFORMATICS

European Conference for the APPLIED MATHEMATICS and INFORMATICS

Vouliagmeni, Athens, Greece
December 29-31, 2010

Editors:
Prof. Nikos Mastorakis, Technical University of Sofia, BULGARIA
Prof. Valeri Mladenov, Technical University of Sofia, BULGARIA
Prof. Metin Demiralp, Istanbul Technical University, TURKEY
Prof. Zoran Bojkovic, University of Belgrade, SERBIA

International Program Committee Members:
Ahmed Boutejdar, GERMANY
Ayoubal-Hamadi, GERMANY
Olga Martin, ROMANIA
Panos Pardalos, USA
Kabir Mashud, GERMANY
Ronald Yager, USA
Amauri Caballero, USA
Nikos Mastorakis, BULGARIA
Mueller Soeren, GERMANY
George Vachtsevanos, USA
Robert Finkel, USA
Demetrios Kazakos, USA
Zhiqiang Gao, USA
Boutejdar Ahmed, GERMANY
Cayrel P-Louis, GERMANY
Yan Wu, USA
Spyros Tragoudas, USA
Arkady Kholodenko, USA
Gregory Baker, USA
Theodore Trafalis, USA
Takis Kasparis, USA
Galigekere Dattatreya, USA
Caroline Sweezy, USA
Asad Salem, USA
Dian Zhou, USA
Thimm Heiko, GERMANY
Daowen Qiu, CHINA
Metin Demiralp, TURKEY
Kleanthis Psarris, USA
Andrew D. Jones, USA
Valeri Mladenov, BULGARIA
Neri F., ITALY
Chen S. Y., P. R. CHINA
Shyi-Ming Chen, R. O. C.
Yen K., USA
Rong-Jyue Fang, TAIWAN
Argyrios Varonides, USA
Nikolai Kobasko, USA
Xu Anping, P. R. CHINA
Zhu H., JAPAN

Table of Contents

ISBN: 978-960-474-260-8

ISBN: 978-960-474-260-8

ISBN: 978-960-474-260-8

Plenary Lecture 1

Density and Approximation by Radial Basis Functions

Professor Vitaly Maiorov

Abstract: We characterize the radial basis functions whose scattered shifts form a fundamental system in the space $L_p(\mathbb{R}^d)$. In particular, we show that for any even function h from the space $L_2(\mathbb{R},\mu)$, the space formed by all possible linear combinations of shifted radial functions $h(\|x+a\|)$, $a\in\mathbb{R}^d$, is dense in the space $L_p(\mathbb{R}^d)$, $1\le p\le 2$, if and only if the function h is not a polynomial. The problems of approximation by radial basis functions also are discussed.

In order to obtain our results we make use of methods of harmonic analysis on the unit ball B^d which are based on a combination of methods of harmonic analysis on the unit sphere $\mathbb{S}^{d-1}$ and the unit segment $\mathbb{U}:=[-1,1]$. Using an orthogonal basis of spherical harmonics on $\mathbb{S}^{d-1}$ and the Gegenbauer basis of orthogonal polynomials on the segment $\mathbb{U}$ we construct a new basis $\mathbf{P}=\{P_n\}$ ('convolution' of bases on $\mathbb{S}^{d-1}$ and on $\mathbb{U}$) consisting of orthogonal polynomials on the ball B^d. The peculiarity of the basis $\mathbf{P}$ is that the moments $M_a(g,a):=\langle g_a,P_n\rangle$ of radial functions of the form $g_a=g(\|x+a\|)$ in some sense allow for a separation of the variables g and a. That is, we represent them by the finite sum $M_a(g,a)=\sum_k u_k(g)v_k(a)$, where $u_k(g)$ are a linear functionals of g and $v_k(a)$ are a functions on $\mathbb{R}^d$.

ISBN: 978-960-474-260-8

Authors Index

ISBN: 978-960-474-260-8