# St. Petersburg Mathematical Journal

(Formerly Leningrad Mathematical Journal)

Volume 22 Number 5 October 2011

A Translation of

РОССИЙСКАЯ АКАДЕМИЯ НАУК

# АЛГЕБРА и АНАЛИЗ

TOM 22 № 5 2010



American Mathematical Society

Providence, Rhode Island USA ISSN 1061-0022

### ST. PETERSBURG MATHEMATICAL JOURNAL

(Formerly Leningrad Mathematical Journal)

A translation of the Russian bimonthly

Алгебра и анализ

"Наука", С.-Петербургское отделение, 2010 г.

### **Editorial Board**

A. B. Aleksandrov
A. N. Andrianov
N. K. Nikol'skiĭ
(Deputy Editor-in-Chief)
A. N. Parshin

V. M. Babich M. A. Semenov-Tyan-Shanskiï A. D. Baranov A. A. Suslin

(Executive Secretary) T. A. Suslina V. S. Buslaev N. N. Ural'tseva

S. V. Buyalo (Deputy Editor-in-Chief)

O. Ya. Viro
V. P. Khavin
S. V. Kislyakov
A. L. Chistov
(Editor-in-Chief)
A. V. Yakovlev

P. P. Kulish

SUBSCRIPTION INFORMATION. The 2011 subscription is for one volume of six issues. Beginning in 2004, St. Petersburg Mathematical Journal is accessible from www.ams.org/journals/. Subscription prices for Volume 22 are US\$1966 list, US\$1572.80 institutional member. Upon request, subscribers to paper delivery of this journal are also entitled to receive electronic delivery. For paper delivery, subscribers outside the United States and India must pay a postage surcharge of US\$19; subscribers in India must pay a postage surcharge of US\$28. Expedited delivery to destinations in North America US\$32; elsewhere US\$73. Subscription renewals are subject to late fees. See www.ams.org/journal-faq for more journal subscription information.

### BACK NUMBER INFORMATION. For back issues see www.ams.org/bookstore.

Orders for subscriptions and publications of the American Mathematical Society should be addressed to the American Mathematical Society, P.O. Box 845904, Boston, MA 02284-5904 USA. *All orders must be accompanied by payment*. Other correspondence should be addressed to 201 Charles Street, Providence, RI 02904-2294 USA.

COPYING AND REPRINTING. Material in this journal 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 Acquisitions Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. Requests can also be made by e-mail to reprint-permission@ams.org.

St. Petersburg Mathematical Journal (ISSN 1061-0022) is published bimonthly by the American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. Periodicals postage paid at Providence, Rhode Island. Postmaster: Send address changes to St. Petersburg Mathematical Journal, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

Manuscripts should be addressed to "Algebra i Analiz", St. Petersburg Publishing Company of the Russian Academy of Sciences, Mendeleevskaya Liniya 1, St. Petersburg 199034, Russia. Submitting simultaneously a tex-file to the address pmj@pdmi.ras.ru is highly appreciated.

© 2011 American Mathematical Society. All rights reserved.

This journal is indexed in  $Mathematical\ Reviews$  and  $Zentralblatt\ MATH.$ 

This journal is archived in *Portico*.

Translation authorized by the All-Union Agency for Author's Rights, Moscow. Printed in the United States of America.

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

10 9 8 7 6 5 4 3 2 1 16 15 14 13 12 11

# St. Petersburg Mathematical Journal

Volume 22 Number 5 October 2011

A Translation of

РОССИЙСКАЯ АКАДЕМИЯ НАУК

# АЛГЕБРА и АНАЛИЗ

TOM 22 № 5 2010



American Mathematical Society

Providence, Rhode Island USA ISSN 1061-0022

### ST. PETERSBURG MATHEMATICAL JOURNAL

(Formerly Leningrad Mathematical Journal)

A translation of the Russian bimonthly

Алгебра и анализ

"Наука", С.-Петербургское отделение, 2010 г.

### **Editorial Board**

A. B. Aleksandrov
A. N. Andrianov
N. K. Nikol'skiĭ
(Deputy Editor-in-Chief)
A. N. Parshin

V. M. Babich M. A. Semenov-Tyan-Shanskiï A. D. Baranov A. A. Suslin

(Executive Secretary) T. A. Suslina V. S. Buslaev N. N. Ural'tseva

S. V. Buyalo (Deputy Editor-in-Chief)

O. Ya. Viro
V. P. Khavin
S. V. Kislyakov
A. L. Chistov
(Editor-in-Chief)
A. V. Yakovlev

P. P. Kulish

SUBSCRIPTION INFORMATION. The 2011 subscription is for one volume of six issues. Beginning in 2004, St. Petersburg Mathematical Journal is accessible from www.ams.org/journals/. Subscription prices for Volume 22 are US\$1966 list, US\$1572.80 institutional member. Upon request, subscribers to paper delivery of this journal are also entitled to receive electronic delivery. For paper delivery, subscribers outside the United States and India must pay a postage surcharge of US\$19; subscribers in India must pay a postage surcharge of US\$28. Expedited delivery to destinations in North America US\$32; elsewhere US\$73. Subscription renewals are subject to late fees. See www.ams.org/journal-faq for more journal subscription information.

### BACK NUMBER INFORMATION. For back issues see www.ams.org/bookstore.

Orders for subscriptions and publications of the American Mathematical Society should be addressed to the American Mathematical Society, P.O. Box 845904, Boston, MA 02284-5904 USA. *All orders must be accompanied by payment*. Other correspondence should be addressed to 201 Charles Street, Providence, RI 02904-2294 USA.

COPYING AND REPRINTING. Material in this journal 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 Acquisitions Department, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. Requests can also be made by e-mail to reprint-permission@ams.org.

St. Petersburg Mathematical Journal (ISSN 1061-0022) is published bimonthly by the American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA. Periodicals postage paid at Providence, Rhode Island. Postmaster: Send address changes to St. Petersburg Mathematical Journal, American Mathematical Society, 201 Charles Street, Providence, RI 02904-2294 USA.

Manuscripts should be addressed to "Algebra i Analiz", St. Petersburg Publishing Company of the Russian Academy of Sciences, Mendeleevskaya Liniya 1, St. Petersburg 199034, Russia. Submitting simultaneously a tex-file to the address pmj@pdmi.ras.ru is highly appreciated.

© 2011 American Mathematical Society. All rights reserved.

This journal is indexed in  $Mathematical\ Reviews$  and  $Zentralblatt\ MATH.$ 

This journal is archived in *Portico*.

Translation authorized by the All-Union Agency for Author's Rights, Moscow. Printed in the United States of America.

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

10 9 8 7 6 5 4 3 2 1 16 15 14 13 12 11

## CONTENTS

# Research Papers

A. V. Badanin and E. L. Korotyaev, Spectral estimates for a periodic fourth-	
order operator	703
R. A. Bashmakov, A. A. Putintseva, and P. C. Yulmukhametov, Entire	
functions of sine type and their applications	737
N. Veniaminov, Homogenization of periodic differential operators of high order	751
M. V. Ignat'ev, Orthogonal subsets of root systems and the orbit method	777
N. O. Kotelina and A. B. Pevnyĭ, Extremal properties of spherical semidesigns	795
A. Petrunin, On intrinsic isometries to Euclidean space	803
S. S. Platonov, Spectral synthesis in some topological vector spaces of functions	813
L. Sakhnovich, The Krein differential system and integral operators of random	
matrix theory	835

# RUSSIAN CONTENTS $^*$

## Статьи

1
49
69
104
131
140
154
186

 $<sup>^*</sup>$ The American Mathematical Society scheme for transliteration of Cyrillic may be found at the end of index issues of  $Mathematical\ Reviews$ .

1061-0022(201110)22:5;1-C