Orthogonal Polynomials and Special Functions

SIAM Activity Group on Orthogonal Polynomials and Special Functions

★ ★ ★ ★ **Newsletter** ★ ★ ★ ★

Published Three Times a Year | June 2002 | Volume 12, Number 3

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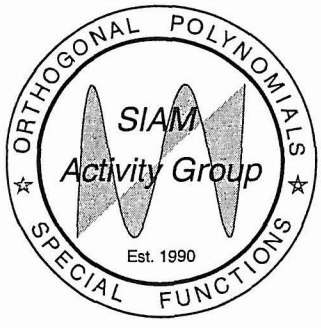

From the Editors

This is the new issue for the summer of 2002 and it will be the last one of the present team of co-editors. As it was announced in the previous issues a new *Communications Committee* will take the responsibility of editing OPSF Net and the Newsletter. One of us (RAN) is leaving the editorship activities because he was appointed as an assistant of the General Editor of the Spanish Royal Mathematical Society (Real Sociedad Matemática Española) in February 2002. We want to thank all officers for their help and support during this four years, specially Charles Dunkl, Martin Muldoon and Walter Van Assche whose comments helped us to improve the Newsletter.

As usual, we thank all the contributors to the present issue and hope you will find interesting and useful information in the Newsletter.

June 15, 2002

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Obituary: W.J. Thron (1918-2001)

Wolfgang Joseph Thron, professor emeritus of mathematics of the University of Colorado in Boulder, Colorado, died at home of emphysema on August 21, 2001, a few days after his 83rd birthday. Thron was very well known for his work on continued fractions and his book *Continued Frac-*

tions, Analytic Theory and Applications (with W. B. Jones), which appeared in 1980, is one of the most valuable books on the subject. Wolf Thron was born on August 17, 1918 in Ribnitz (Germany). In 1936 Thron first was sent to the ETH in Zürich (Switzerland) and then to Princeton University, where his aunt and uncle (Herman Weyl) could keep an eye on him and lend him a helping hand if necessary. After his B.A. degree from Princeton in 1939 he held a teaching fellowship at Washington State University in Pullman, and a year later he accepted a teaching fellowship for graduate study at the mathematics department of Rice University, where he worked under supervision of Walter Leighton. Thron's thesis was on parabolic convergence regions for continued fractions and his results (published in 1942 and 1943) significantly improved the original parabola theorem of W. T. Scott and H. S. Wall, which appeared in 1940. During the next six decades Wolfgang Thron made several important contributions in the convergence theory for continued fractions. Approximately one third of his publications have been devoted to continued fractions. A recent look on MathSciNet revealed 142 publications by Wolfgang Thron, and Zentralblatt MATH even gives 153 publications. Thron has at least four publications with more than 50 citations: the paper *Accelerating convergence of limit periodic continued fractions* $K(a_n/1)$ (Numer. Math. **34** (1980), 155–170) with H. Waadeland, the well written survey *Moment theory, orthogonal polynomials, quadrature, and continued fractions associated with the unit circle* (Bull. London Math. Soc. **21** (1989), 113–152) with W. B. Jones and O. Njåstad, the paper *A strong Stieltjes moment problem* (Trans. Amer. Math. Soc. **261** (1980), 503–528) with W. B. Jones and H. Waadeland, and the related *Orthogonal Laurent polynomials and the strong Hamburger moment problem* (J. Math. Anal. Appl. **98** (1984), 528–554) with W. B. Jones and O. Njåstad, clearly have been very influential. Thron also has his own continued fraction: the T-fraction, which is related to two point Padé approximation and Laurent orthogonal polynomials.

Wolfgang Thron started his long career at the University of Colorado in Boulder in 1954 filling in the vacancy in mathematics when Albert Edrei moved to Syracuse University. He had 21 Ph. D. students and wrote two books: in 1966 a book on *Topological Structures*, and in 1980 the book with Bill Jones on continued fractions, which was mentioned earlier. Thron spent a lot of time at foreign universities: in 1957–58 he was at the University of Münich, close to Oscar Perron, in 1962–63 and in 1974–75 he was at Punjab University in Chandigarh, India, in 1966-67 he was at Mindanao State University in the Philippines, in 1970–71 he was at Erlangen University in Germany, and in 1978-79, 1982–83, 1987 he worked at the University of Trondheim in Norway. There he continued a long and productive collaboration with Lisa Jacobsen (now Lorentzen), Olav Njåstad and Haakon Waadeland. Thron became Professor Emeritus upon his retirement in 1985. In recognition of his outstanding work in continued fractions and related topics, an inter-

national conference was held at the University of Colorado in June, 1988 at the occasion of his 70th birthday. The proceedings were published in the Rocky Mountain Journal of Mathematics, volume 21 (1991), and included in these proceedings was a description of Thron's life and work written by his former student and long time collaborator W. B. Jones (*W. J. Thron on his 70th birthday*, Rocky Mountain J. Math. **21** (1991), 7–23), which includes a list of his Ph. D. students and 116 papers (up to 1990). Most of the information in the present obituary is taken from this source and from obituaries that were sent to me by Bill Jones.

Walter Van Assche
(walter@wis.kuleuven.ac.be)

Reports from Meetings and Conferences

1. IXth International Scientific Kravchuk Conference. Kyiv (Ukraine), May 16-19, 2002

The conference took place from May 16 to May 19, 2002 at the National Technical University of Ukraine (Kyiv). About 700 scientists of 20 countries were present.

Many FSU (Former Soviet Union) countries have been searching for national self-identification during the past decade. The name of Mykhailo Kravchuk (Krawtchouk)[1] has a particular meaning for independent Ukraine. He was a mathematician with an established scientific reputation who become a victim of Stalin's reprisals, and as the author of contemporary Ukrainian mathematical terminology he became a symbolical figure.

The opening ceremonies of the Kravchuk conferences always had a very solemn character, but now it had a special character because 2002 is 110 years after the birthday of the scientist. There were recollections about M. Kravchuk, a performance of musicians and a chorus. The political scientist I. Kachanovski told about the unique role that Mykhailo Kravchuk played in the invention of the electronic computer. It was announced that one of streets in Kyiv this year will be called after academician M. Kravchuk. And finally a new book was presented containing selected papers by M. Kravchuk.

For the first time the awards established by the Organizing Committee and the *Fund for Contributing to the Development of Mathematical Science* were handed to the writer M. Soroko (the author of the novel *Krawtchouk Kolyma theorem*: Kolyma is the river in East Siberia where the camp was in which Kravchuk has perished) , V. Groza (for research on Krawtchouk q-polynomials and Meixner-Krawtchouk q-functions), V. Savva and V. Zelenkov (for the study of the Krawtchouk oscillator) and S. Lukashuk (a school teacher, founder of the museum the Kravchuk's native village).

There were four sections at the conference:

1. Differential and Integral Equations, and their Applications.
2. Algebra, Geometry. Mathematical and Numerical Analysis.
3. Probability Theory and Mathematical Statistics.
4. History and Techniques of Mathematical Teaching.

Below we list some talks devoted to orthogonal polynomials and special functions.

- *Kachanovski I.:* Mykhailo Krawtchouk and the invention of the electronic computer.
- *Burjakov A. N. et al.:* On the solution of thermoelasticity problems by using integral transforms, methods of dual equations, special functions including Struve functions.
- *Zelenkov V.* On one generalization of Krawtchouk polynomials.
- *Kirillova T. V. et al.:* About one representation of Krawtchouk polynomials.
- *Fisher B., Jolevsaka-Tuneska B., Kilicman A.:* On defining the incomplete gamma-function.
- *Hriptun M. D.:* Group-theoretic interpretation of some properties of a generalization of cylindrical functions.
- *Groza V. A.:* q-analog of the Burchnall Chaundy's formula.

The participants are grateful to academician M. Zgurovski, the chairman of the Organizing Committee, and certainly also to Nina Virchenko, the initiator of the Kravchuk conferences, long-term contributor and

[1] I will use the spelling *Kravchuk* when I mean the surname and *Krawtchouk* when referring to Krawtchouk polynomials and functions.

propagandist of Kravchuk's scientific inheritance and biography professor, for her warm hospitality. The next conference will take place in 2004.

Vadim Zelenkov
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Forthcoming Meetings and Conferences

1. IMA 2002 Summer Program: Special Functions in the Digital Age, Institute for Mathematics and its Applications, University of Minnesota (USA), July 22-August 2, 2002.

Information taken from

http://www.ima.umn.edu/digital-age/

Description.

The IMA workshop will use the DLMF (Digital Library of Mathematical Functions) project as a foundation and discuss what more should be done, what areas are incomplete or unrepresented, what are the resulting mathematical, symbolic, numerical and web issues, applications in physics, chemistry, etc., relationships with the Bateman project, and potential for other digital libraries in other mathematical areas. The workshop is to have a very broad outlook, encompassing a wide range of subjects connected with special functions, as well as issues concerning digital libraries and the delivery of mathematics over the internet.

A major portion of this program (7 days) will be assessments of research progress and promising vistas for future research by distinguished experts in the areas of asymptotics, combinatorial functions, statistics, computer algebra, algebraic and group theoretic methods, applications to the physical sciences, orthogonal polynomials, numerical methods, zeta functions & random matrices, Painlevé functions, elliptic functions, elliptic hypergeometric functions and the Heun function group, with the aim of pointing out what is of greatest importance in the theory and applications, and what should be included in digital library projects.

The remainder of the program (3 days) will be devoted to Digital Libraries generally and, specifically, Digital Libraries and the Mathematical Sciences, including the delivery of mathematics over the Internet. It will conclude with a panel on the "Future of Mathematical Digital Libraries", with panelists from the special functions research and users communities, as well as representatives from mathematics societies and government funding agencies.

There will be several discussion sessions to develop specific recommendations for special function topics to be included in future Digital Libraries in Mathematics. Also there will be poster sessions, and several software demonstrations (particularly of computer algebra and numerical packages for special functions), and much of the software will be available during the program for informal use by participants. This program will link with special function related sessions at the Foundations of Computational Mathematics (FoCM'02) meeting that will be hosted by the IMA, August 5–15, 2002.

The program is meant for researchers in the theory and computation of special functions (definitely including people new to the field who are looking for the most promising areas for future research), for users of special functions, and for persons interested in the delivery of mathematics over the Internet.

For additional information on the Program Plan and Tentative Schedule as well as a list of confirmed participants please visit the Conference site

http://www.ima.umn.edu/digital-age/

Walter Van Assche
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2. Workshop on Special Functions at FoCM'02, Foundations of Computational Mathematics conference, Minnesota (USA), August 5-7, 2002

The next Foundations of Computational Mathematics conference will be held at University of Minnesota on 5-14 August 2002, as guests of the Institute for Mathematics and its Applications.

With plenary talks taking part in morning, afternoons during the FoCM'02 conference will be devoted to workshops. Each workshop will be three-days long, with six workshops running in parallel. The responsibility for organising, scheduling and timetabling the workshops rests with workshop organisers.

Talks in FoCM workshops are by invitation, but feel free to contact relevant workshop organisers if you wish to present a talk.

During the Conference there will be a three days (5–7 August) workshop on "Special Functions" organized by Tom Koornwinder (thk@science.uva.nl) (Amsterdam) and Adri Olde Daalhuis (adri@maths.ed.ac.uk) (Edinburgh).

For further information see the web:

http://turing.wins.uva.nl/~thk/FoCM02/

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3. Summer school in Orthogonal Polynomials and Special Functions. Leuven (Belgium), August 12-17, 2002
Sponsored by the SIAM OPSF Activity Group

From August 12-17, 2002, a summer school in Orthogonal Polynomials and Special Functions takes place at the Katholieke Universiteit Leuven, Belgium. This summer school is the third in a series after Laredo (Spain), 2000, and Inzell (Germany), September 17-21, 2001 (see `http://www.gsf.de/ibb/ag1/summerschool/`).

The lecturers for the Leuven summer school are:

- Wolfram Koepf (Kassel): Computer Algebra Algorithms for Orthogonal Polynomials and Special Functions.
- Arno Kuijlaars (Leuven): Riemann-Hilbert Analysis of Orthogonal Polynomials.
- Adri Olde Daalhuis (Edinburgh): Exponential Asymptotics.
- Margit Roesler (Goettingen): Dunkl Operators: Theory and Applications.
- Dennis Stanton (Minnesota): Enumeration and Special Functions.
- Joris Van der Jeugt (Gent): $3n-j$ coefficients and orthogonal polynomials of hypergeometric type.

The registration fee is 150 euro until July 15, 2002, and 200 euro after July 15, 2002. Accommodation: housing in a student residence building is 20 euros per night. Depending on sponsors, there will be the possibility of (partial) funding of participants. The school is organised by Walter Van Assche and Erik Koelink. More information and registration on the 2002 Leuven summer school can be found at

`http://aw.twi.tudelft.nl/~koelink/opsf2002.html`

or contacting with Walter Van Assche at `walter.vanassche@wis.kuleuven.ac.be` Erik Koelink at `h.t.koelink@its.tudelft.nl`

Erik Koelink
(`h.t.koelink@its.tudelft.nl`)

4. Laredo Summer School on Approximation Methods in Systems Theory, Laredo, Spain. September 2-6, 2002.
Sponsored by the SIAM OPSF Activity Group

An international Summer School on Approximation Methods in Systems Theory will be held in Laredo, Spain in the framework of The Summer Courses of Universidad de Cantabria. This is a joint activity with Universidad Carlos III de Madrid in order to attract postgraduate students as well as researchers interested in Approximation Theory and the applications in Systems Theory.

The lecturers will be:

- Laurent Baratchart (INRIA, Sophia-Antipolis, France) Extremal Problems for Analytic Functions and System Identification.
- Adhemar Bultheel (Department of Computer Science, Katholieke Universiteit Leuven, Belgium) Orthogonal bases for numerically Robust System Identification.
- Diederich Hinrichsen (Fachbereich 3, (Mathematik), Universität Bremen, Germany) Spectral Analysis of uncertain systems.
- Guillermo López Lagomasino (Departamento de Matemáticas, Universidad Carlos III de Madrid, Spain) Approximation of Transfer Functions for Control Systems of finite dimension.
- Francisco Marcellán (Departamento de Matemáticas, Universidad Carlos III de Madrid, Spain) Orthogonal Functions in Systems and Control.

Postgraduate students can apply for grants.

Organizers: Guillermo López Lagomasino (`lago@math.uc3m.es`) and Francisco Marcellán (`pacomarc@ing.uc3m.es`). Departamento de Matemáticas. Universidad Carlos III de Madrid.

Francisco Marcellán
(`pacomarc@ing.uc3m.es`)

5. Chennai Meeting on Special Functions and Their Applications. Chennai (India), September 23-27, 2002
Sponsored by the SIAM OPSF Activity Group

An international conference "Special Functions and Their Applications" will be held in Chennai, India in the period September 23-27, 2002.

General Information

This is an International conference on Special Functions and their Applications, to be held at the Institute of Mathematical Sciences, Chennai, India, from September 23-27, 2002. The plenary lectures and invited talks by experts, the Papers/Posters by researchers will emphasize recent trends and the developments in the topics of interest to be covered. The objective of the Conference, cosponsored by

the Society for Special Functions and their Applications (SSFA) of India and the Orthogonal Polynomials and Special Functions (OPSF) Activity Group of SIAM, is to bring together experts and active research workers with a broad spectrum of interests for fruitful exchange of ideas.

Plenary/Invited Speakers

- R. P. Agarwal (Lucknow, India)
- S. Akiyama (Niigata Univ., Japan)
- S. Balasubramanian (IMSc, India)
- B. C. Berndt (UIUC, USA)
- S. Bhargava (Univ. Mysore, India)
- F. Calogero (INFN, Rome, Italy)
- M. Hata (Kyoto Univ., Japan)
- M. E. H. Ismail (Univ. South Florida, USA)
- S. Kanemitsu (Fukuoka Univ., Japan)
- A. U. Klymik (ITP, Kiev, Ukraine)
- K. Miyake (Tokyo Univ., Japan)
- Y. Tanigawa (Nagoya Univ., Japan)
- D. Lozier (NIST, USA)
- W. Van Assche (KULeuven, Belgium)
- G. Vanden Berghe (Univ. Gent, Belgium)
- J. Van der Jeugt (Univ. Gent, Belgium)
- A. Verma (IIT, Roorkee, India)
- M. Waldschmidt (Univ. Paris, France)
- M. Yoshida (Fukuoka Univ., Japan)

Participation

Participants should be active research scientists, students in the field of Special Functions and their Applications. The topics of the conference are:

1. q-Series
2. Number Theory
3. Hypergeometric series
4. Numerical Methods
5. Group Theory of Special Functions
6. Combinatorics
7. Non-linear ODES
8. Orthogonal Polynomials
9. Applications to Physics

Interested participants are requested to send by e-mail (or on plain paper) details giving their name, address, age, qualifications, present position and a resume of research work done. (Maximum number of participants: 60).

Address for Correspondence:

Prof. K. Srinivasa Rao,
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FAX: +91-44-254 1586
URL: `http://www.imsc.ernet.in/~icsf2002`

Martin Muldoon
(`muldoon@yorku.ca`)

6. Special session on Special functions and Combinatorics. Madison Wisconsin, October 12-13, 2002.

Meeting of the American Mathematical Society. Special session on Special functions and Combinatorics. Madison Wisconsin, October 12-13, 2002.

Organizers: Richard Askey (`askey@math.wisc.edu`) and Paul Terwilliger (`terwilli@math.wisc.edu`)

Topics: The orthogonal polynomials of the Askey scheme and related topics in combinatorics, representation theory and integrable systems.

If you are interested in participating please contact one of the organizers. General information about the conference can be found at the AMS website `http://www.ams.org/meetings/`

Paul Terwilliger
(`terwilli@math.wisc.edu`)

7. Special session on "Special Functions and q-Series". Baltimore, January 15-18, 2003

Meeting and book dedicated to Mizan Rahman.

The American Mathematical Society has approved a special session on "Special Functions and q-Series" for the

Annual Meeting of the Society to be held in Baltimore during January 15-18, 2003. This special session is organised by Mourad E. H. Ismail, University of South Florida. See `http://www.ams.org/amsmtgs/2074_intro.html` for more information.

We take the opportunity of having such a session to honour Mizan Rahman and dedicate the talks to him in recognition of his many contributions to the subject. The list of confirmed speakers includes, amongst others: Richard Askey, George Andrews, Bruce Berndt, George Gasper, Mourad Ismail, Erik Koelink, Steve Milne, Michael Schlosser, Dennis Stanton, Sergei Suslov, and of course, Mizan Rahman.

The book "*Theory and Applications of Special Functions. A volume dedicated to Mizan Rahman*" will appear in the series *Developments in Mathematics*, edited by Krishnaswami Alladi and a companion series to the *Ramanujan Journal*. Mourad E.H. Ismail and Erik Koelink will act as editors for this book dedicated to Mizan Rahman. Research papers will be refereed with high standards comparable to those of the Ramanujan Journal, Constructive Approximation or Journal of Approximation Theory. We invite contributions to the volume and those interested please submit the paper no later than 2/2/2003, and send it to:

Denise Marks, Department of Mathematics,
University of South Florida,
4202 E. Fowler Ave., PHY 114
Tampa, FL 33620-5700, USA

If you prefer a particular one of the editors to handle your paper, please indicate your preference at the time of submission.

We hope that both the meeting and the book will reflect Mizan Rahman's contributions to and influence on mathematics and mathematicians.

Mourad Ismail and Erik Koelink

Erik Koelink
(`h.t.koelink@its.tudelft.nl`)

8. Special Session on Constructive Approximation Theory. Seville (Spain), June 18-21, 2003

The American Mathematical Society has approved a special session on "Constructive Approximation Theory" for the First Joint International Meeting between the American Mathematical Society (AMS) and the Real Sociedad Matemática Española (RSME).

This session is organized by Antonio Duran, University of Sevilla (`duran@us.es`) and Edward B. Saff, Vanderbilt University (`esaff@math.vanderbilt.edu`).

The topics to be considered are Aproximation Theory, Orthogonal Polynomials and related topics.

Further information will appear in the WWW

`http://www.us.es/rsme-ams/`

and also in the AMS WWW page

`http://www.ams.org/amsmtgs/2083_program.html`

Renato Álvarez-Nodarse
(`ran@us.es`)

9. Fourth ISAAC Congress 2003. York University, Toronto (Canada), August 11-16, 2003

On behalf of the ISAAC (International Society for Analysis, its Applications and Computation) board, the local organizing committee and the Department of Mathematics and Statistics at York University, I am pleased to announce that the fourth ISAAC Congress will be held at York University in Toronto, Canada, from August 11, 2003 to August 16, 2003.

We hope to be able to announce the list of plenary speakers and the list of special sessions in the near future.

More information on the 3rd ISAAC Congress is at `http://www.math.fu-berlin.de/~isaac/`

Man-Wah Wong
(`mwwong@mathstat.yorku.ca`)

This series should not be confused with the meetings sponsored by ISSAC (International Symposium on Symbolic and Algebraic Computation). Nor should we confuse this ISAAC with another one: International Society for Augmentative and Alternative Communication.

Martin Muldoon
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10. Seventh International Symposium on Orthogonal Polynomials, Special Functions and Applications Copenhagen (Denmark), August 18-22, 2003

The *S*eventh International Symposium on Orthogonal Polynomials, Special Functions and Applications will be held in Copenhagen, August 18–22, 2003. The plan is that the meeting will take place at the Department of Mathematics of the University of Copenhagen.

The conference will be a continuation of the series of International Conferences with the meetings of Sevilla (1997), Patras (1999) and Rome/Ostia (2001) as the immediate predecessors.

Information about the meeting will be made available at

the homepage

`http://www.math.ku.dk/conf/opsfa2003/`

The invited speakers are:

- Richard Askey, University of Wisconsin, Madison, USA
- Percy Deift, New York University, USA
- Antonio J. Duran, University of Sevilla, Spain
- Uffe Haagerup, University of Southern Denmark, Denmark
- Mourad Ismail, University of South Florida, USA
- Erik Koelink, Technical University Delft, the Netherlands
- Masatoshi Noumi, Kobe University, Japan
- Franz Peherstorfer, University of Linz, Austria
- Simon Ruijsenaars, Center for Mathematics and Computer Science, the Netherlands
- Jan Felipe van Diejen, University of Talca, Chile
- Yuan Xu, University of Oregon, USA

The international scientific committee is

- Antonio J. Duran, University of Sevilla, Spain
- Mourad E. H. Ismail, University of South Florida, USA
- Erik Koelink, Technical University Delft, the Netherlands
- Paolo Emilio Ricci, University of Rome "La Sapienza", Italy
- Vilmos Totik, Bolyai Institute, Hungary and University of South Florida, USA
- Christian Berg, University of Copenhagen
- Henrik L. Pedersen, University of Copenhagen

The local organizing committee will be Christian Berg (`berg@math.ku.dk`), Jacob Stordal Christiansen (`stordal@math.ku.dk`) and Henrik L. Pedersen (`henrikp@math.ku.dk`)

You may contact us via email: `opsfa@math.ku.dk`

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Future Planning

There are plans to organize a summer school on Orthogonal Polynomials and Special Functions in Portugal in July 2003. (Contact person: Amilcar Branquinho). These summer schools are part of our Activity Group's scientific program. The scientific committee consists of Erik Koelink, Rupert Lasser, Amilcar Branquinho, Paco Marcellan and Walter Van Assche.

Books and Journals

Book Announcements

1. The Mysteries of the Real Prime. M.J. Shai Haran, Technion-Israel Institute of Technology, Haifa, Israel, London Mathematical Society Monographs, New Series 25 (2002) ISBN: 0-19-850868-9

This information is taken from

`http://www.oup-usa.org/isbn/0198508689.html`

The Mysteries of the Real Prime, M.J. Shai Haran, Technion-Israel Institute of Technology, Haifa, Israel.

In this important and original monograph, useful for both academic and professional researchers and students of mathematics and physics, the author describes his work on the Riemann zeta function and its adelic interpretation. It provides an original point of view, bringing new, highly useful dictionaries between different fields of mathematics. It develops an arithmetical approach to the continuum of real numbers and unifies many areas of mathematics including: Markov Chains, q-series, Elliptic curves, the Heisenberg group, quantum groups, and special functions (such as the Gamma, Beta, Zeta, theta, Bessel functions, the Askey-Wilson and the classical orthogonal polynomials) The text discusses real numbers from a p-adic point of view, first introduced by Arakelov. It includes original work on coherent theory, with implications for number theory and uses ideas from probability theory including Markov chains and noncommutative geometry which unifies the p-adic theory and the real theory by constructing a theory of quantum orthogonal polynomials.

Table of Contents

Tom Koornwinder
(thk@science.uva.nl)

2. Quantum Calculus. V. Kac and P. Cheung Springer-Verlag. Series: Universitext (2002) 112 pp. ISBN: 0-387-95341-8

This information is taken from

http://www.springer.de/

Simply put, quantum calculus is ordinary calculus without taking limits. This undergraduate text develops two types of quantum calculi, the q-calculus and the h-calculus.

As this book develops quantum calculus along the lines of traditional calculus, the reader discovers, with a remarkable inevitability, many important notions and results of classical mathematics.

This book is written at the level of a first course in calculus and linear algebra and is aimed at undergraduate and beginning graduate students in mathematics, computer science, and physics. It is based on lectures and seminars given by Professor Kac over the last few years at MIT.

From the contents: q-derivative and h-derivative.- Generalized Taylor's formula for polynomials.- q-analogue of $(x-a)^n$, n an integer, and q-derivatives of binomials.- q-Taylor's formula for polynomials.- Gauss' binomial formula and a non-commutative binomial formula.- Properties of q-binomial coefficients.- q-binomial coefficients and linear algebra over finite fields.- q-Taylor's formula for formal power series and Heine's binomial formula.- Two Euler identities and two q-exponential functions.- q-trigonometric functions.- Jacobi's triple product identity.- Classical partition function and Euler's product formula.- q-hypergeometric functions and Heine's formula.

Tom H. Koornwinder
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3. Asymptotic approximations of integrals, Roderick Wong. SIAM (2002) ISBN: 0-89871-497-4

The book Asymptotic approximations of integrals by Roderick Wong (earlier published by Academic Press in 1989) has been reprinted by SIAM (Classics in Applied Mathematics, 34). For earlier reviews see Mathematical Reviews 90j:41061 by F. Ursell and Zentralblatt für Mathematik 0679.41001 by K.Chandrasekhara Rao.

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The following information was taken from

http://ec-securehost.com/SIAM/CL34.html

Asymptotic methods are frequently used in many branches of both pure and applied mathematics, and this classic text remains the most up-to-date book dealing with one important aspect of this area, namely, asymptotic approximations of integrals. In Asymptotic Approximations of Integrals, all results are proved rigorously, and many of the approximation formulas are accompanied by error bounds. A thorough discussion on multidimensional integrals is given, and references are provided. Asymptotic Approximations of Integrals contains the "distributional method", which is not available elsewhere. Most of the examples in this text come from concrete applications.

Since its publication twelve years ago, significant developments have occurred in the general theory of asymptotic expansions, including smoothing of the Stokes phenomenon, uniform exponentially improved asymptotic expansions, and hyperasymptotics. These new concepts belong to the area now known as "exponential asymptotics". Expositions of these new theories are available in papers published in various journals, but not yet in book form.

Contents: Preface; Chapter I: Fundamental Concepts of Asymptotics; Chapter II: Classical Procedures; Chapter III: Mellin Transform Techniques; Chapter IV: The Summability Method; Chapter V: Elementary Theory of Distributions; Chapter VI: The Distributional Approach; Chapter VII: Uniform Asymptotic Expansions; Chapter VIII: Double Integrals; Chapter IX: Higher Dimensional Integrals; Bibliography; Symbol Index; Author Index; Subject Index.

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4. Pointwise Convergence of Fourier Series, Juan Arias de Reyna. Series: Lecture Notes in Mathematics. Vol. 1785, Springer (2002) ISBN: 3-540-43270-1

This information is taken from the

http://www.springer.de/

This book contains a detailed exposition of Carleson-Hunt theorem following the proof of Carleson: to this day this is the only one giving better bounds. It points out the motivation of every step in the proof. Thus the Carleson-Hunt theorem becomes accessible to any analyst.The book also contains the first detailed exposition of the fine results of Hunt, Sjölin, Soria, etc on the convergence of Fourier Series. Its final chapters present original material. With both Fefferman's proof and the recent one of Lacey and Thiele in print, it becomes more important than ever to understand and compare these two related proofs with that of Carleson and Hunt. These alternative proofs do not yield all the results of the Carleson-Hunt proof. The intention of this monograph is to make Carleson's proof accessible to a wider audience, and to explain its consequences for the pointwise convergence of Fourier series for functions in spaces near $\mathcal{L}^1$, filling a well-known gap in the literature.

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OP-SF preprints

In this section we will include information on some recent preprints related to Orthogonal Polynomials and Special Functions that were recently posted or cross-listed to one of the subcategories of the xxx archives. See:

- `http://front.math.ucdavis.edu/math.CA`
- `http://front.math.ucdavis.edu/math.CO`
- `http://front.math.ucdavis.edu/math.QA`
- `http://xxx.lanl.gov/archive/solv-int`

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1. math.CO/0201003

   Title: Rim Hook Tableaux and Kostant's η-Function Coefficients

   Authors: Ron M. Adin, Avital Frumkin

   Subj-class: Combinatorics; Representation Theory

2. math.NT/0201024

   Title: Apéry-like difference equation for Catalan's constant

   Authors: Wadim Zudilin (Moscow)

   Subj-class: Number Theory; Classical Analysis; Numerical Analysis

   MSC-class: Primary 39A05, 11B37, 11J70; Secondary 33C20, 33C60, 11B65, 11M06

3. math.NT/0201109

   Title: The moment zeta function and applications

   Authors: Igor Rivin

   Subj-class: Number Theory; Classical Analysis

   MSC-class: 11M06; 60F99; 60C05

4. math.CO/0201136

   Title: Restricted 132-Involutions and Chebyshev Polynomials

   Authors: O. Guibert, T. Mansour

   Subj-class: Combinatorics

5. math.CO/0201140

   Title: On the Eulerian Polynomials of Type D

   Authors: Chak-On Chow

   Subj-class: Combinatorics

   MSC-class: 05A15

6. math.QA/0201177

   Title: Asymptotics and $6j$-symbols

   Authors: Justin Roberts

   Comments: For proceedings of Kyoto conference on quantum invariants, Sept. 2001

   Subj-class: Quantum Algebra; Mathematical Physics

   MSC-class: 22E99; 81R05, 51M20

7. math.AG/0201225

   Title: Nodal curves and Riccati solutions of Painlevé equations

   Authors: Masa-Hiko Saito, Hitomi Terajima

   Subj-class: Algebraic Geometry; Quantum Algebra

   MSC-class: 14D15, 34M55, 32G10

8. math.QA/0201272

   Title: Bilinear summation formulas from quantum algebra representations

   Authors: Wolter Groenevelt

   Subj-class: Quantum Algebra; Classical Analysis

   MSC-class: 33D45, 33D80, 20G42

9. math-ph/0201004

   Title: Cyclic Identities Involving Jacobi Elliptic Functions

   Authors: Avinash Khare, Uday Sukhatme

   Subj-class: Mathematical Physics

10. math-ph/0201026

    Title: On the derivatives of generalized Gegenbauer polynomials

    Authors: W. Garcia Fuertes, A.M. Perelomov

    Comments: submitted to Theor. Math. Phys

    Subj-class: Mathematical Physics

11. math-ph/0201048

    Title: Coupling coefficients of $SO(n)$ and integrals over triplets of Jacobi and Gegenbauer polynomials

    Authors: Sigitas Alisauskas

    Subj-class: Mathematical Physics; Representation Theory

12. math-ph/0201051

    Title: Application of the τ-function theory of Painlevé equations to random matrices: PV, PIII, the LUE, JUE and CUE

    Authors: P.J. Forrester, N.S. Witte

    Subj-class: Mathematical Physics; Exactly Solvable and Integrable Systems

    MSC-class: 15A52;34M55;20F55;60K35

13. math-ph/0201052

Title: "Exact WKB integration" of polynomial $1D$ Schrödinger (or Sturm-Liouville) problem

Authors: A. Voros (CEA/Saclay, SPhT, France)

Subj-class: Mathematical Physics

14. nlin.SI/0201019

Title: Hyperelliptic Solutions of Sine-Gordon Equation and Weierstrass al Functions

Authors: Shigeki Matsutani

Subj-class: Exactly Solvable and Integrable Systems; Algebraic Geometry; Differential Geometry; Mathematical Physics

15. math.CA/0202019

Title: Divergent Cesaro and Riesz means of Jacobi and Laguerre expansions

Authors: Christopher Meaney

Subj-class: Classical Analysis

MSC-class: 42C05, 33C45, 42C10

16. math.DG/0202036

Title: Lax pairs for the equations describing compatible nonlocal Poisson brackets of hydrodynamic type, and integrable reductions of the Lame equations

Authors: O. I. Mokhov

Subj-class: Differential Geometry; Symplectic Geometry; Exactly Solvable and Integrable Systems; Mathematical Physics

17. math.RT/0202076

Title: Jack polynomials for the BC_n root system and generalized spherical functions

Authors: Alexei Oblomkov

Subj-class: Representation Theory

18. math.CA/0202083

Title: Asymptotic analysis for the Dunkl kernel

Authors: Margit Rösler, Marcel de Jeu

Subj-class: Classical Analysis; Representation Theory

MSC-class: 33C52 (Primary) 33C67 (Secondary)

19. math.NT/0202159

Title: An elementary proof of Apery's theorem

Authors: Wadim Zudilin (Moscow)

Subj-class: Number Theory; Classical Analysis; General Mathematics

MSC-class: 11J72

20. math.NT/0202166

Title: On an analytic estimate in the theory of the Riemann Zeta function and a Theorem of Baez-Duarte

Authors: Jean-Francois Burnol

Subj-class: Number Theory

MSC-class: 11M26

21. math.RT/0202182

Title: Enveloping algebra U(gl(3)) and orthogonal polynomials in several discrete indeterminates

Authors: Alexander Sergeev

Subj-class: Representation Theory

MSC-class: 17B10 (Primary) 17B65, 33C45, 33C80 (Secondary)

Journal-ref: Duplij S., Wess J. (eds.) Noncommutative structures in mathematics and physics, Proc. NATO Advanced Research Workshop, Kiev, 2000. Kluwer, 2001, 113–124

22. math.CV/0202203

Title: Linear combinations of sections and tails of Mittag-Leffler functions and their zeros

Authors: N.A. Zheltukhina

Subj-class: Complex Variables; Classical Analysis

MSC-class: 30C15

23. math.CA/0202232

Title: Reduction formulae for Karlsson-Minton type hypergeometric functions

Authors: Hjalmar Rosengren

Subj-class: Classical Analysis

MSC-class: 33D15, 33D67

24. math.CA/0202235

Title: Asymptotic properties of a family of solutions of the Painleve equation PVI

Authors: O Costin, R D Costin

Subj-class: Classical Analysis

MSC-class: 34M55; 34M30

25. math.NT/0202270

Title: A class of generalized gamma functions

Authors: Jean-Paul Jurzak

Subj-class: Number Theory

26. math.QA/0202272

Title: Dilogarithme Quantique et $6j$-Symboles Cycliques

Authors: Stephane Baseilhac

Comments: In French (abstract in English). Former 3rd chapter of the Author's PhD thesis

Subj-class: Quantum Algebra

27. math.NT/0202273

Title: Partial Euler products as a new approach to Riemann hypothesis

Authors: Jean-Paul Jurzak

Subj-class: Number Theory

28. cond-mat/0202276

Title: Vicious walkers, friendly walkers and Young tableaux III: Between two walls

Authors: Christian Krattenthaler, Anthony J. Guttmann, Xavier G. Viennot

Subj-class: Statistical Mechanics; Combinatorics

MSC-class: 82B23 (Primary) 05A15 05E05 82B20 (Secondary)

29. nlin.SI/0201008

Title: Symbolic computation of exact solutions expressible in hyperbolic and elliptic functions for nonlinear partial differential and differential-difference equations

Authors: D. Baldwin, U. Goktas, W. Hereman, L. Hong, R. S. Martino, J. Miller

Comments: Software available from Willy Hereman's home page at `http://www.mines.edu/fs_home/whereman/`

Subj-class: Exactly Solvable and Integrable Systems

30. hep-th/0201195

Title: Onsager's algebra and partially orthogonal polynomials

Authors: G. von Gehlen

Subj-class: High Energy Physics - Theory; Exactly Solvable and Integrable Systems

31. nlin.SI/0202037

Title: Rational solutions to the Pfaff lattice and Jack polynomials

Authors: Mark Adler, Vadim B. Kuznetsov, Pierre van Moerbeke

Subj-class: Exactly Solvable and Integrable Systems

32. nlin.SI/0202044

Title: On a class of algebraic solutions to Painlevé VI equation, its determinant formula and coalescence cascade

Authors: Tetsu Masuda

Subj-class: Exactly Solvable and Integrable Systems

33. math.CA/0203026

Title: Polynomials of Meixner's type in infinite dimensions-Jacobi fields and orthogonality measures

Authors: E. Lytvynov

Subj-class: Classical Analysis; Probability Theory

MSC-class: 60G51; 60G57

34. math.QA/0203049

Title: Modular transformations of the elliptic hypergeometric functions, Macdonald polynomials, and the shift operator

Authors: G. Felder, L. Stevens, A. Varchenko

Subj-class: Quantum Algebra

35. math.CO/0203094

Title: New polynomial analogues of Jacobi'striple product and Lebesgue's identities

Authors: Krishnaswami Alladi, Alexander Berkovich

Subj-class: Combinatorics; Number Theory; Quantum Algebra

MSC-class: 05A19, 05A30, 11P82, 33D15

36. math.CO/0203111

Title: Some Observations on Dyson's New Symmetries of Partitions

Authors: Alexander Berkovich, Frank G. Garvan

Comments: to appear in Journal of Combinatorial Theory, Series A

Subj-class: Combinatorics; Number Theory; Quantum Algebra

MSC-class: 11P81, 11P83, 05A17, 33D15

37. math.NT/0203120

Title: Two complete and minimal systems associated with the zeros of the Riemann zeta function

Authors: Jean-Francois Burnol

Subj-class: Number Theory

38. math.QA/0203136

Title: Askey-Wilson Type Functions, With Bound States

Authors: Luc Haine, Plamen Iliev

Subj-class: Quantum Algebra; Classical Analysis

MSC-class: 33D45, 37K10, 14H70, 39A70, 39A13

39. math.RT/0203211

Title: Matrix Valued Spherical Functions Associated to the Three Dimensional Hyperbolic Space

Authors: F. A. Grunbaum, I. Pacharoni, J. Tirao

Subj-class: Representation Theory; Classical Analysis

MSC-class: 22E30; 22E46; 33C45

40. math.CO/0203226

Title: Restricted Permutations, Fibonacci Numbers, and k-generalized Fibonacci Numbers

Authors: Eric S. Egge, Toufik Mansour

Subj-class: Combinatorics

MSC-class: 05A15

41. math.CO/0203229

Title: q-Hypergeometric proofs of polynomial analogues of the triple product identity, Lebesgue's identity and Euler's pentagonal number theorem

Authors: S. Ole Warnaar

Subj-class: Combinatorics; Quantum Algebra

MSC-class: 05A19, 33D15

42. math.CA/0203264

Title: Transforming the Heun equation to the hypergeometric equation I: Polynomial transformations

Authors: Robert S. Maier

Subj-class: Classical Analysis; Mathematical Physics

MSC-class: 33E30 (Primary) 34M35, 33C05 (Secondary)

43. math-ph/0203015

Title: Linear Differential Equations and Orthogonal Polynomials: A Novel Approach

Authors: N. Gurappa, Prasanta K. Panigrahi, T. Shreecharan

Subj-class: Mathematical Physics

44. math-ph/0203020

Title: A note on the theorems of M. G. Krein and L. A. Sakhnovich on continuous analogs of orthogonal polynomials on the circle

Authors: Alexander Teplyaev

Subj-class: Mathematical Physics; Functional Analysis; Spectral Theory

MSC-class: 34L40 31A25 31A35 34B40 34F05 41A10 42C05 42C15 42C30 44A60 45P05 47A10 47A11 47B25 47B80 47E05 60H2

45. math-ph/0203031

Title: Quantum systems related to root systems and radial parts of Laplace operators

Author: M.A.Olshanetsky, A.M.Perelomov

Comments: an old paper (1978) posted for archival purposes

Subj-class: Mathematical Physics

Journal-ref: Funct. Anal. Appl. 12 (1978) 121-128

46. math-ph/0203049

Title: τ-Function Evaluation of Gap Probabilities in Orthogonal and Symplectic Matrix Ensembles

Authors: P.J. Forrester, N.S. Witte

Subj-class: Mathematical Physics

MSC-class: 15A52;33E17;58F07

47. math-ph/0203052

Title: Closed-form sums for some perturbation series involving hypergeometric functions

Authors: Nasser Saad, Richard L. Hall

Subj-class: Mathematical Physics

48. math-ph/0203058

Title: Zeros of polynomials orthogonal on several intervals

Authors: Franz Peherstorfer

Subj-class: Mathematical Physics; Classical Analysis

MSC-class: 42c05

49. math.CA/0204098

Title: Dicrete Analogues of the Laguerre Inequality

Authors: Ilia Krasikov

Subj-class: Classical Analysis

50. math.QA/0204103

Title: Quantum Symmetric Pairs and Their Zonal Spherical Functions

Authors: Gail Letzter

Subj-class: Quantum Algebra; Representation Theory

MSC-class: 17B37

51. math.CA/0204248

Title: Riemann–Hilbert analysis for Laguerre polynomials with large negative parameter

Authors: A.B.J. Kuijlaars, K.T-R McLaughlin

Comments: To appear in Computational Methods and Function Theory

Subj-class: Classical Analysis; Complex Variables

MSC-class: 30E15; 33C45

52. math.CA/0204294

Title: A connection between orthogonal polynomials on the unit circle and matrix orthogonal polynomials on the real line

Authors: Maria J. Cantero, Maria P. Ferrer, Leandro Moral, Luis Velazquez

Subj-class: Classical Analysis

MSC-class: 42C05

53. math.CA/0204299

Title: Measures and semi-orthogonal functions on the unit circle

Authors: Maria J. Cantero, Maria P. Ferrer, Leandro Moral, Luis Velazquez

Subj-class: Classical Analysis

MSC-class: 42C05

54. math.CA/0204300

Title: Five-diagonal matrices and zeros of orthogonal polynomials on the unit circle

Authors: Maria J. Cantero, Leandro Moral, Luis Velazquez

Subj-class: Classical Analysis

MSC-class: 42C05

55. math.FA/0204304

Title: Asymptotics of determinants of Bessel operators

Authors: Estelle L. Basor, Torsten Ehrhardt

Subj-class: Functional Analysis; Mathematical Physics

MSC-class: 47B35; 82B

56. math.CA/0204317

Title: Multiplicity of zeros and discrete orthogonal polynomials

Authors: Ilia Krasikov

Subj-class: Classical Analysis

MSC-class: 30C15, 33C47

57. math-ph/0204001

Title: Distribution of the first particle in discrete orthogonal polynomial ensembles

Authors: Alexei Borodin, Dmitriy Boyarchenko

Subj-class: Mathematical Physics; Classical Analysis; Exactly Solvable and Integrable Systems

58. math-ph/0204006

Title: Universality for eigenvalue correlations from the modified Jacobi unitary ensemble

Authors: Arno Kuijlaars, Maarten Vanlessen

Subj-class: Mathematical Physics; Classical Analysis

MSC-class: 15A52; 82B44

59. math-ph/0204008

Title: Application of the τ-function theory of Painlevé equations to random matrices: PVI, the JUE, CyUE, cJUE and scaled limits

Authors: P.J. Forrester, N.S. Witte

Subj-class: Mathematical Physics

MSC-class: 15A52;33E17;58F07

60. math-ph/0204012

Title: Deformation of the three-term recursion relation and the generation of new orthogonal polynomials

Authors: A. D. Alhaidari

Subj-class: Mathematical Physics

61. math-ph/0204025

Title: The generating function for a particular class of characters of $SU(n)$

Authors: Wifredo Garcia Fuertes, Askold Perelomov

Subj-class: Mathematical Physics

62. math-ph/0204026

Title: Associated Lamé Equation, Periodic Potentials and $sl(2, R)$

Authors: Asish Ganguly

Subj-class: Mathematical Physics

Journal-ref: published, Mod. Phys. Lett. A15(2000),1923

63. math-ph/0204054

Title: A Generalization of Landen's Quadratic Transformation Formulas for Jacobi Elliptic Functions

Authors: Avinash Khare, Uday Sukhatme

Subj-class: Mathematical Physics

64. nlin.SI/0204043

Title: Einstein–Weyl spaces and dispersionless Kadomtsev–Petviashvili equation from Painlevé I and II

Authors: Maciej Dunajski, Paul Tod

Subj-class: Exactly Solvable and Integrable Systems; Differential Geometry

65. nlin.SI/0204054

Title: Partition functions for Matrix Models and Isomonodromic Tau functions

Authors: M. Bertola, B. Eynard, J. Harnad

Subj-class: Exactly Solvable and Integrable Systems; Mathematical Physics

66. math.CA/0206032

Title: Inversion of bilateral basic hypergeometric series.

Author: Michael Schlosser.

Subj-class: Classical Analysis, Combinatorics

67. math.CA/0205160

Title: Bilinear semi-classical moment functionals and their integral representation.

Author: Marco Bertola.

Subj-class: Classical Analysis

68. math.GM/0205183

Title: On the real zeroes of the Hurwitz zeta-function and Bernoulli polynomials.

Authors: A. P. Veselov, J. P. Ward.

Subj-class: Classical Analysis

69. math.CO/0205031

Title: A limiting form of the q-Dixon ${}_4\phi_3$ summation and related partition identities.

Authors: Krishnaswami Alladi, Alexander Berkovich.

Subj-class: Combinatorics, Quantum algebras

70. math.QA/0206030

Title: Selberg Integrals, Multiple Zeta Values and Feynman Diagrams.

Authors: David H. Wohl.

Subj-class: Quantum algebras, Mathematical Physics

71. math.QA/0205313

Title: Special functions, KZ type equations and Representation theory.

Authors: Alexander Varchenko.

Subj-class: Quantum algebras, Mathematical Physics

72. nlin.SI/0205063

Title: On a q-Difference Painlevé III Equation: II. Rational Solutions

Authors: Kenji Kajiwara

Subj-class: Exactly Solvable and Integrable Systems

73. nlin.SI/0205019

Title: On a q-Difference Painlevé III Equation: I. Derivations, Symmetry and Riccati Type Solutions

Authors: Kenji Kajiwara, Kinji Kimura

Subj-class: Exactly Solvable and Integrable Systems

Problems and Solutions

Thus far 22 problems have been submitted, seven of which have been solved in previous issues. Still unsolved are Problems #3, 5, 8, 9, 11, 12, 13, 15, 17, 18, 19, 20, 21 and 22. This time no new problems have been submitted.

19. Uniform Bounds for Shifted Jacobi Multiplier Sequences. For Fourier series the following is immediate: Suppose the real or complex sequence $\{m_k\}$ generates a bounded operator on $L^p(\mathbf{T})$, $1 \le p \le \infty$, i.e., for polynomial f

$$\Big\| \sum m_k \hat{f}_k e^{ik\varphi} \Big\|_{L^p(\mathbf{T})} \le \|m\|_{M^p(\mathbf{T})} \Big\| \sum \hat{f}_k e^{ik\varphi} \Big\|_{L^p(\mathbf{T})} ,$$

then one has for the shifted sequence $\{m_{k+j}\}_{k\in\mathbf{Z}}$ that

$$\sup_{j\in\mathbf{N}_0} \|\{m_{k+j}\}\|_{M^p(\mathbf{T})} \le C \, \|m\|_{M^p(\mathbf{T})} , \; 1 \le p \le \infty . \quad (1)$$

Looking at cosine expansions on $L^p(0,\pi)$ one easily derives the analog of (1) via the addition formula

$$\cos(k \pm j)\theta = \cos k\theta \cos j\theta \mp \sin k\theta \sin j\theta$$

provided the periodic Hilbert transform is bounded, i.e., for $1 < p < \infty$. More generally, by Muckenhoupt's transplantation theorem [2, Theorem 1.6],

$$\Big(\int_0^\pi \Big| \sum m_{k+j} \, a_k \, P_k^{(\alpha,\beta)}(\cos\theta) \Big|^p \sin^{2\alpha+1}\frac{\theta}{2} \cos^{2\beta+1}\frac{\theta}{2} \, d\theta \Big)^{1/p}$$

$$\equiv \Big(\int_0^\pi \Big| \sum m_{k+j} \, b_k \, \phi_k^{(\alpha,\beta)}(\cos\theta) \Big|^p w_{\alpha,\beta,p}(\theta) \, d\theta \Big)^{1/p}$$

$$\approx \Big(\int_0^\pi \Big| \sum m_{k+j} \, b_k \, \cos k\theta \Big|^p w_{\alpha,\beta,p}(\theta) \, d\theta \Big)^{1/p} ,$$

where $P_k^{(\alpha,\beta)}$ are the Jacobi polynomials, $\phi_k^{(\alpha,\beta)}(\cos\theta)$ are the orthonormalized Jacobi functions with respect to $d\theta$, and

$$w_{\alpha,\beta,p}(\theta) = \sin^{(2-p)(\alpha+1/2)}\frac{\theta}{2} \cos^{(2-p)(\beta+1/2)}\frac{\theta}{2} .$$

Therefore, the above argument for cosine expansions also applies to Jacobi expansions provided the periodic Hilbert transform is bounded with respect to the weight function $w_{\alpha,\beta,p}$; hence, the analog of (1) holds for Jacobi expansions when

$$\frac{2\alpha+2}{\alpha+3/2} < p < \frac{2\alpha+2}{\alpha+1/2} , \qquad \alpha \ge \beta \ge -\frac{1}{2} .$$

(i) Can the above p-range be extended? By Muckenhoupt [2, (1.3)], a fixed shift is bounded for all p, $1 < p < \infty$.

(ii) Consider the corresponding problem for Laguerre expansions (for the appropriate setting see [1]); a fixed shift is easily seen to be bounded for all $p \ge 1$.

Both questions are of course trivial for $p = 2$ since $\ell^\infty = M^2$ by Parseval's formula.

References

[1] Gasper, G. and W. Trebels: On necessary multiplier conditions for Laguerre expansions, Canad. J. Math. 43 (1991), 1228 – 1242.

[2] Muckenhoupt, B.: Transplantation Theorems and Multiplier Theorems for Jacobi Series, Memoirs Amer. Math. Soc., Vol. 64, No. 356, Providence, R.I., 1986.

(Submitted on May 19, 1998)

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20. Question about Elliot's formula Generalization of Legendre's identity for complete elliptic integrals

Let E, K be the complete elliptic integrals. Then

$$K'E + KE' - KK' = \pi/2 \qquad (*)$$

This is the special case $p = r = -a+1/2$, $q = c+a-3/2$ in Elliott's identity (see Erdelyi e.a., Higher Transcendental Functions, Vol. 1, p. 85):

$$\begin{aligned} &F(p+\tfrac12,-r-\tfrac12,1+p+q;z)F(-p+\tfrac12,r+\tfrac12;1+q+r;1-z)\\ &+F(p+\tfrac12,-r+\tfrac12,1+p+q;z)F(-p-\tfrac12,r+\tfrac12;1+q+r;1-z)\\ &-F(p+\tfrac12,-r+\tfrac12,1+p+q;z)F(-p+\tfrac12,r+\tfrac12;1+q+r;1-z)\\ &=\frac{\Gamma(p+q+1)\Gamma(q+r+1)}{\Gamma(p+q+r+\frac32)\Gamma(q+\frac12)} \qquad (**)\end{aligned}$$

Question 1. Is there a counterpart of Legendre's identity (*) for incomplete elliptic integrals?

Question 2. The Elliott identity (**) provides a generalization of the identity (*) to hypergeometric functions. The only handbook where I have seen this identity is Bateman vol. I. Has Elliott's identity been used or mentioned elsewhere in papers/books?

Question 3. Are there generalizations of the Elliott identity (**) to the ${}_pF_q$ case or to other generalizations of hypergeometric functions?

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21. Question on an exact solvable Schrödinger equation

What are all the Schrödinger equations that have exact solutions expressible in terms of the Kampé de Fériet function?

(Submitted on June 3, 1999)

Ernst Davidovich Krupnikov
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22. Question about Kampé de Fériet series

How to prove the following reduction identities for the Kampé de Fériet series:

$$\mathrm{F}^{1:1;3}_{1:0;2}\left(\begin{matrix}2\\5/2\end{matrix}\middle|\begin{matrix}1\\-\end{matrix}\middle|\begin{matrix}1,1,1\\2,2\end{matrix}\middle|x,x\right) = {}_2\mathrm{F}_1\left(\begin{matrix}1,1\\3/2\end{matrix}\middle|x\right){}_3\mathrm{F}_2\left(\begin{matrix}1,1,1\\3/2,2\end{matrix}\middle|x\right), \qquad (2)$$

$$\mathrm{F}^{2:1;3}_{2:0;2}\left(\begin{matrix}2,2\\5/2,3\end{matrix}\middle|\begin{matrix}1\\-\end{matrix}\middle|\begin{matrix}1,1,1\\2,2\end{matrix}\middle|x,x\right) = \left[{}_3\mathrm{F}_2\left(\begin{matrix}1,1,1\\3/2,2\end{matrix}\middle|x\right)\right]^2, \qquad (3)$$

$$\mathrm{F}^{2:1;2}_{2:0;1}\left(\begin{matrix}2,2\\3,3\end{matrix}\middle|\begin{matrix}1\\-\end{matrix}\middle|\begin{matrix}1,1\\2\end{matrix}\middle|1,1\right) = 4\,{}_4\mathrm{F}_3\left(\begin{matrix}1,1,1,1\\2,2,2\end{matrix}\middle|1\right), \qquad (4)$$

$$\mathrm{F}^{3:1;2}_{3:0;1}\left(\begin{matrix}2,2,2\\3,3,3\end{matrix}\middle|\begin{matrix}1\\-\end{matrix}\middle|\begin{matrix}1,1\\2\end{matrix}\middle|1,1\right) = 2\,{}_5\mathrm{F}_4\left(\begin{matrix}1,1,1,1,1\\2,2,2,2\end{matrix}\middle|1\right)? \qquad (5)$$

Is it possible to generalize them?

Ernst Davidovich Krupnikov
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Miscellaneous

1. CAOP flies again

CAOP is a package for calculating formulas by Maple for orthogonal polynomials belonging to the Askey scheme. It was developed by Rene Swarttouw in 1996 as one of the deliverables in a temporary project sponsored by RIACA. See OP-SF NET, 3.4 (1996), Topic 12. For some time this has worked well, but afterwards CAOP could no longer be made active on the web site where it resided.

Recently CAOP has revived on the web page

`http://amstel.wins.uva.nl:7090/CAOP/`

It is now maintained by Tom Koornwinder, in cooperation with Rene Swarttouw and Wolfram Koepf. Many thanks to Andre Heck, who provided technical assistance.

Tom H. Koornwinder
(thk@science.uva.nl)

2. Wolfram Research's Mathematical Functions

Dear Colleagues, Let me invite you to visit the new version of our site with 37000 formulas:

`http://functions.wolfram.com`

See also the modified

`http://mathworld.wolfram.com`

(which has returned).

Oleg Marichev
(oleg@wolfram.com)

3. History of Approximation Theory Homepage

This item, which appeared in AT-NET BULLETIN NO. 108, is included at the suggestion of Tom Koornwinder. For AT-NET Bulletin, see the WWW home-page:

`http://www.uni-giessen.de/www-Numerische-Mathematik/at-net`

History of Approximation Theory Homepage

We wish to announce the beginnings of a homepage devoted to the History of Approximation Theory (HAT). It is to be found at:

`http://www.math.technion.ac.il/hat/`

or at its mirror site:

`http://www.cs.wisc.edu/~deboor/HAT/`

We welcome any and all suggestions, comments, help, support and criticism.

Allan Pinkus
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About the Activity Group

The SIAM Activity Group on Orthogonal Polynomials and Special Functions consists of a broad set of mathematicians, both pure and applied. The Group also includes engineers and scientists, students as well as experts. We have around 150 members scattered about in more than 20 countries. Whatever your specialty might be, we welcome your participation in this classical, and yet modern, topic. Our WWW home page is:

`http://math.nist.gov/opsf/`

which currently covers the topics: Conference Calendar; Books, Conference Proceedings, etc.; Compendia, tools, etc.; Compiled booklist on OP-SF; Meeting Reports; Projects; Problems; Personal, Obituaries, etc.; History; Positions available; Miscellaneous; Memberlist; Preprint Servers and Links to WWW pages of interest to members. This is a convenient point of entry to all the services provided by the Group. Our Webmaster is Bonita Saunders (`bonita.saunders@nist.gov`).

The *Newsletter* is a publication of the Activity Group. It appears three times a year and is mailed by SIAM. Back issues are accessible at:

`http://www.mathematik.uni-kassel.de/~koepf/siam.html`

and

`ftp://euler.us.es/pub/newsletter`

To receive the *Newsletter*, you must be a member of SIAM and of the Activity Group. SIAM has several categories of membership, including low-cost categories for students and residents of developing countries. For current information on SIAM and Activity Group membership, contact:

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WWW : `http://www.siam.org`
`http://www.siam.org/membership/outreachmem.htm`

The Activity Group also sponsors an electronic news net, called the OP-SF Net, which is transmitted periodically by SIAM. It is provided as a free public service; membership in SIAM is not required. The OP-SF Net Editor is Martin Muldoon (`muldoon@yorku.ca`). The Net provides fast turnaround compared to the *Newsletter*. To receive the Net, send your name and email address to `poly-request@siam.org`. To contribute a news item to the Net, send email to `poly@siam.org` with a copy to the OP-SF Net Editor. Please note that submissions to the Net are automatically considered for the *Newsletter*, and vice versa, unless the contributor requests otherwise. Back issues can be obtained at the WWW addresses:

`http://turing.wins.uva.nl/ thk/opsfnet`

`http://www.math.ohio-state.edu/JAT`

`http://math.nist.gov/opsfnet/archive`

Finally, the Activity Group operates an email discussion group, called OP-SF Talk. To subscribe, send the email message

subscribe opsftalk Your Name

to `listproc@nist.gov` . To contribute an item to the discussion, send email to `opsftalk@nist.gov` . The archive of all messages is accessible at:

`http://math.nist.gov/opsftalk/archive`

How to Contribute to the Newsletter

Send your Newsletter contributions directly to one of the Co-editors:

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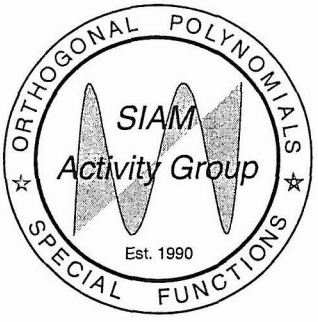
preferably by e-mail, and in LaTeX format. Other formats are also acceptable and can be submitted by e-mail, regular mail or fax.

Deadline for submissions to be included in the October issue 2002 is September 15, 2002.



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