OP–SF Net is distributed through OP–SF Talk.
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Topics:
1. Announcement: OPSFA–16 date changed to 2022, dedicated to Richard Askey
5. Announcement: JMM 2021 AMS Special Session on The Legacy of Dick Askey
6. Essay by Tom Koornwinder: Hendrik Lorentz and Harry Bateman
7. Preprints in arXiv.org
8. Submitting contributions to OP–SF NET and SIAM–OPSF (OP–SF Talk)
9. Thoughts of the Month by Bertrand Russell

Calendar of Events:

January 6–9, 2021
2021 Joint Mathematics Meetings, American Mathematical Society,
Happening Virtually in 2021. Join your colleagues online for the latest in mathematics.

AMS Special Session on The Legacy of Dick Askey,
Organized by Howard Cohl, Mourad Ismail and George Andrews,
https://jointmathematicsmeetings.org/meetings/national/jmm2021/2247_program_ss39.html

AMS Special Session on Continued Fractions,
Organized by James McLaughlin, Geremías Polanco Encarnación, Barry Smith, Nancy J. Wyshinski,
https://jointmathematicsmeetings.org/meetings/national/jmm2021/2247_program_ss62.html

June 7–11, 2021
33rd International Colloquium on Group Theoretical Methods in Physics (Group33)
Cotonou, Benin
http://www.cipma.net/group33–cotonou–benin
June 20–26, 2021
8th European Congress of Mathematics (8ECM)
Mini-symposium on Orthogonal Polynomials and Special Functions
Organized by Paco Marcellán, Juan J. Moreno-Balcázar and Galina Filipuk,
Portorož, Slovenia
https://www.8ecm.si/minisymposia

July 6–9, 2021
Functional Analysis, Approximation Theory and Numerical Analysis (FAATNA)
Matera, Italy
http://web.unibas.it/faatna20/

July 12–16, 2021
9th International Conference on Computational Methods and Function Theory (CMFT 2021)
Federico Santa María Technical University, Valparaíso, Chile
http://cmft2021.inf.utfsm.cl/

July 19–24, 2021
Mathematical Congress of the Americas (MCA 2021)
Special Session on Special Functions and Orthogonal Polynomials
Organized by Diego Dominici, Luis E. Garza, Jan Felipe van Diejen
Buenos Aires, Argentina
http://www.mca2021.org/en

August 9–13, 2021
OPSFA Summer School 2021
Radboud University, Nijmegen, The Netherlands
https://www.ru.nl/radboudsummerschool/courses/2021/opsfa-summer-school/

OPSFA–16
Centre de Recherches Mathématiques, Montreal, Canada

Topic #1 _______ OP – SF Net 27.6 _______ November 15, 2020

From: Luc Vinet (vinet@CRM.UMontreal.CA)
Subject: Announcement: OPSFA–16 date changed to 2022, dedicated to Richard Askey

The 16th International Symposium on Orthogonal Polynomials, Special Functions and Applications (OPSFA–16) will take place at the Centre de Recherches Mathématiques (CRM) in Montreal in 2022 (instead of 2021 as initially planned). The tentative dates are July 11–15, 2022.

The call for Mini Symposia proposals will be made in January 2021.

This conference will be dedicated to the memory of Richard Askey.

The Organizing Committee consists of:
• Hendrik De Bie (Ghent University)
• Jan Felipe van Diejen (University of Talca)
• Erik Koelink (Radboud University)
• Mourad H. E. Ismail (University of Central Florida)
• Ana Loureiro (University of Kent)
• Francesco Marcellán (University Carlos III de Madrid)
• Sarah Post (University of Hawaii)
• Margit Rösler (University of Paderborn)
• Luc Vinet (Chair) (CRM, University of Montréal)
From: Howard S.Cohl (howard.cohl@nist.gov)  
and Mourad E. H. Ismail (mourad.eh.ismail@gmail.com)  

We would like to draw your attention to the following set of Lecture Notes published by Cambridge University Press: London Mathematical Society Lecture Note Series, 464.

Lectures on Orthogonal Polynomials and Special Functions,  
OPSFA Sixth Summer School, Norbert Wiener Center, University of Maryland,  
College Park, Maryland, July 11-15, 2016.

Edited by Howard S. Cohl, National Institute of Standards and Technology, USA,  
and Mourad E. H. Ismail, University of Central Florida, Orlando, Florida, USA.

Publisher: Cambridge University Press  
Online publication date: October 2020  
publication year: 2020  
Online ISBN: 9781108908993  
DOI: https://doi.org/10.1017/9781108908993

Link to CUP: LMS Lecture Note Series 464.

Description: Written by experts in their respective fields, this collection of pedagogic surveys provides detailed insight and background into five separate areas at the forefront of modern research in orthogonal polynomials and special functions at a level suited to graduate students. A broad range of topics are introduced including exceptional orthogonal polynomials, \( q \)-series, applications of spectral theory to special functions, elliptic hypergeometric functions, and combinatorics of orthogonal polynomials. Exercises, examples and some open problems are provided. The volume is derived from lectures presented at the OPSF-S6 Summer School in 2016 at the University of Maryland, and has been carefully edited to provide a coherent and consistent entry point for graduate students and newcomers.

Five lectures:

1. Antonio Durán (70 pages):  
   Exceptional Orthogonal Polynomials via Krall Discrete Polynomials;

2. Mourad E. H. Ismail (53 pages):  
   a Brief Review of \( q \)-Series;

3. Erik Koelink (76 pages):  
   Applications of Spectral Theory to Special Functions;

4. Hjalmar Rosengren (65 pages):  
   Elliptic hypergeometric functions; and

5. Jiang Zeng (52 pages):  
   Combinatorics of Orthogonal Polynomials and their Moments
Table of Contents:

Contributors page x
Preface xi

1. Exceptional Orthogonal Polynomials via Krall Discrete Polynomials 1
   Antonio J. Durán
   1.1 The classical and classical discrete families 4
       1.1.1 Weights on the real line 4
       1.1.2 The three-term recurrence relation 5
       1.1.3 Some examples of orthogonal polynomials 6
       1.1.4 Second-order differential operator 10
       1.1.5 Characterization theorem 12
       1.1.6 The classical families and the basic quantum models 13
       1.1.7 The classical discrete families 15
   1.2 Expanding the Askey tableau 18
       1.2.1 The Askey tableau 18
       1.2.2 Krall and exceptional polynomials 21
       1.2.3 Krall polynomials 23
       1.2.4 Darboux transforms 25
   1.3 $\mathcal{D}$-operators 30
       1.3.1 $\mathcal{D}$-operators 30
       1.3.2 $\mathcal{D}$-operators on the stage 32
       1.3.3 $\mathcal{D}$-operators of type 2 37
   1.4 Constructing Krall polynomials by using $\mathcal{D}$-operators 38
       1.4.1 Back to the orthogonality 39
       1.4.2 Krall–Laguerre polynomials 40
       1.4.3 Krall discrete polynomials 42
   1.5 Exceptional discrete polynomials 48
       1.5.1 Comparing the Krall continuous and discrete cases 48
       1.5.2 First expansion of the Askey tableau 50
       1.5.3 Exceptional polynomials 53
       1.5.4 Constructing exceptional discrete polynomials by using duality 56
   1.6 Exceptional polynomials 60
       1.6.1 Exceptional Charlier polynomials: admissibility 60
       1.6.2 Exceptional Hermite polynomials by passing to the limit 62
       1.6.3 Exceptional Meixner and Laguerre polynomials 64
       1.6.4 Second expansion of the Askey tableau 68
       1.6.5 Appendix: invariance and symmetries 68
References 70

2. A Brief Review of $q$-Series 76
   Mourad E.H. Ismail
   2.1 Introduction 76
   2.2 Notation and $q$-operators 77
   2.3 $q$-Taylor series 81
   2.4 Summation theorems 85
   2.5 Transformations 90
   2.6 $q$-Hermite polynomials 94
   2.7 The Askey-Wilson polynomials 101
   2.8 Ladder operators and Rodrigues formulas 106
   2.9 Identities and summation theorems 113
   2.10 Expansions 115
   2.11 Askey–Wilson expansions 119
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.1</td>
<td>Three levels of hypergeometry</td>
<td>236</td>
</tr>
<tr>
<td>4.2.2</td>
<td>Elliptic hypergeometric sums</td>
<td>237</td>
</tr>
<tr>
<td>4.2.3</td>
<td>The Frenkel–Turaev sum</td>
<td>240</td>
</tr>
<tr>
<td>4.2.4</td>
<td>Well-poised and very well-poised sums</td>
<td>243</td>
</tr>
<tr>
<td>4.2.5</td>
<td>The sum $\sum_{12} V_{11}$</td>
<td>245</td>
</tr>
<tr>
<td>4.2.6</td>
<td>Biorthogonal rational functions</td>
<td>249</td>
</tr>
<tr>
<td>4.2.7</td>
<td>A quadratic summation</td>
<td>250</td>
</tr>
<tr>
<td>4.2.8</td>
<td>An elliptic Minton summation</td>
<td>254</td>
</tr>
<tr>
<td>4.2.9</td>
<td>The elliptic gamma function</td>
<td>255</td>
</tr>
<tr>
<td>4.2.10</td>
<td>Elliptic hypergeometric integrals</td>
<td>257</td>
</tr>
<tr>
<td>4.2.11</td>
<td>Spiridonov’s elliptic beta integral</td>
<td>259</td>
</tr>
<tr>
<td>4.3</td>
<td>Solvable lattice models</td>
<td>263</td>
</tr>
<tr>
<td>4.3.1</td>
<td>Solid–on–solid models</td>
<td>263</td>
</tr>
<tr>
<td>4.3.2</td>
<td>The Yang–Baxter equation</td>
<td>265</td>
</tr>
<tr>
<td>4.3.3</td>
<td>The $R$-operator</td>
<td>267</td>
</tr>
<tr>
<td>4.3.4</td>
<td>The elliptic SOS model</td>
<td>268</td>
</tr>
<tr>
<td>4.3.5</td>
<td>Fusion and elliptic hypergeometry</td>
<td>270</td>
</tr>
</tbody>
</table>

References | 277 |

5. Combinatorics of Orthogonal Polynomials and their Moments

5.1 Introduction | 280

5.2 General and combinatorial theories of formal OPS

5.2.1 Formal theory of orthogonal polynomials | 283

5.2.2 The Flajolet–Viennot combinatorial approach | 291

5.3 Combinatorics of generating functions

5.3.1 Exponential formula and Foata’s approach | 294

5.3.2 Models of orthogonal Sheffer polynomials | 297

5.3.3 MacMahon’s Master Theorem and a Mehlertype formula | 299

5.4 Moments of orthogonal Sheffer polynomials | 304

5.4.1 Combinatorics of the moments | 304

5.4.2 Linearization coefficients of Sheffer polynomials | 309

5.5 Combinatorics of some $q$-polynomials

5.5.1 Al–Salam–Chihara polynomials | 315

5.5.2 Moments of continuous $q$–Hermite, $q$–Charlier and $q$–Laguerre polynomials | 315

5.5.3 Linearization coefficients of continuous $q$–Hermite, $q$–Charlier and $q$–Laguerre polynomials | 316

5.5.4 A curious $q$–analogue of Hermite polynomials | 319

5.5.5 Combinatorics of continued fractions and $\gamma$–positivity | 324

5.6 Some open problems | 328

References | 330
From: Tom H. Koornwinder (thkmth@xs4all.nl)

Subject: Announcement: Askey–Bateman Project Vol. 1. Univariate Orthogonal Polynomials

We would like to draw your attention to the publication of the first volume of Encyclopedia of Special Functions, The Askey–Bateman Project. Volume 1. Univariate Orthogonal Polynomials.

Edited by Mourad E. H. Ismail, University of Central Florida, Orlando, Florida, USA, assisted by Walter Van Assche, Katholieke Universiteit, Leuven, Belgium.

Publisher: Cambridge University Press
Publication date: September 2020
ISBN: 9780521197427


Description: This is the first of three volumes that form the Encyclopedia of Special Functions, an extensive update of the Bateman Manuscript Project. Volume 1 contains most of the material on orthogonal polynomials, from the classical orthogonal polynomials of Hermite, Laguerre and Jacobi to the Askey–Wilson polynomials, which are the most general basic hypergeometric orthogonal polynomials. Separate chapters cover orthogonal polynomials on the unit circle, zeros of orthogonal polynomials and matrix orthogonal polynomials, with detailed results about matrix–valued Jacobi polynomials. A chapter on moment problems provides many examples of indeterminate moment problems. A thorough bibliography rounds off what will be an essential reference.

Table of Contents:

List of contributors ix
Preface xi
1. Preliminaries 1
   Mourad E. H. Ismail
2. General Orthogonal Polynomials 16
   Mourad E. H. Ismail
3. Jacobi and Related Polynomials 51
   Mourad E. H. Ismail
4. Recursively Defined Polynomials 100
   Mourad E. H. Ismail
5. Wilson and Related Polynomials 119
   Mourad E. H. Ismail
6. Discrete Orthogonal Polynomials 129
   Mourad E. H. Ismail
7. Some $q$-Orthogonal Polynomials 157
   Mourad E. H. Ismail
8. The Askey–Wilson Family of Polynomials 178
   Mourad E. H. Ismail
9. Orthogonal Polynomials on the Unit Circle 199
   L. Golinskii
10. Zeros of Orthogonal Polynomials 242
    A. Laforgia & M. Muldoon
11. The Moment Problem 269
    C. Berg & J. S. Christiansen

7
From: Tom H. Koornwinder (thkmath@xs4all.nl)
Subject: Announcement: Askey–Bateman Project Vol. 2. Multivariable Special Functions

We would like to draw your attention to the publication of the first volume of Encyclopedia of Special Functions, The Askey–Bateman Project.
Edited by Tom H. Koornwinder, Universiteit van Amsterdam, The Netherlands, and Jasper V. Stokman, Universiteit van Amsterdam, The Netherlands.

Publisher: Cambridge University Press
Publication date: October 2020
publication year: 2020
ISBN: 9781107003736


Description: This is the second of three volumes that form the Encyclopedia of Special Functions, an extensive update of the Bateman Manuscript Project. Volume 2 covers multivariable special functions. When the Bateman project appeared, study of these was in an early stage, but revolutionary developments began to be made in the 1980s and have continued ever since. World-renowned experts survey these over the course of 12 chapters, each containing an extensive bibliography. The reader encounters different perspectives on a wide range of topics, from Dunkl theory, to Macdonald theory, to the various deep generalizations of classical hypergeometric functions to the several variables case, including the elliptic level. Particular attention is paid to the close relation of the subject with Lie theory, geometry, mathematical physics and combinatorics.

Table of Contents:
List of Contributors ix
Preface xi
1. General Overview of Multivariable Special Functions 1
   T. H. Koornwinder and J. V. Stokman
2. Orthogonal Polynomials of Several Variables 19
   Yuan Xu
3. Appell and Lauricella Hypergeometric Functions 79
   K. Matsumoto
4. $A$–Hypergeometric Functions 101
   N. Takayama
5. Hypergeometric and Basic Hypergeometric Series and Integrals Associated with Root Systems 122
   M. J. Schlosser
6. Elliptic Hypergeometric Functions Associated with Root Systems 159
   H. Rosengren and S. O. Warnaar
We would like to invite you to attend the virtual JMM 2021 AMS Special Session on The Legacy of Dick Askey.

Organizers: Howard S. Cohl, Mourad E.H. Ismail and George E. Andrews

All times below are U.S. Mountain Standard Time (the time zone of Denver, Colorado)

Thursday January 7, 2021, 8:00 a.m.–11:50 a.m.
AMS Special Session on The Legacy of Dick Askey, I

8:00 a.m. **Persi Diaconis**, Chenyang Zhong
Orthogonal Polynomials and the Burnside Process.

8:30 a.m. **Tom H. Koornwinder**
Charting the Askey and $q$–Askey schemes.

9:00 a.m. **Kathy A. Driver**
Zeros of Jacobi polynomials.

9:30 a.m. **Erik Koelink**, Maarten van Pruijssen, Pablo Román
Multivariable matrix valued orthogonal polynomials from representation theory.

10:00 a.m. **Jacob Stordal Christiansen**, Barry Simon, Maxim Zinchenko
Residual Polynomials.

10:30 a.m. **Hjalmar Rosengren**
On the Kanade–Russell identities.

11:00 a.m. **Roger Howe**
Dick Askey and Mathematics Education.

11:30 a.m. **Al Cuoco**
Adventures with Dick in Mathematics Education.

Friday January 8, 2021, 1:00 p.m.–5:50 p.m.
AMS Special Session on The Legacy of Dick Askey, II

1:00 p.m. **George E. Andrews**
Chebyshev polynomials and Compositions.

1:30 p.m. Jennifer Balakrishnan, William Craig, **Ken Ono**, Wei–Lun Tsai
Variants of Lehmer’s Conjecture on Ramanujan’s tau–function.

2:00 p.m. **Luc Vinet**, Alexei Zhedanov
A unified algebraic underpinning for the Hahn polynomials and rational functions.
2:30 p.m. Doron Zeilberger*
   How Richard Askey Inspired the Happy Marriage of Special Functions and Combinatorics.
3:00 p.m. Dennis Stanton*
   Combinatorics of type $R_l$ orthogonal polynomials.
3:30 p.m. Warren P. Johnson*
   Functional Equations in the Research and Teaching of Dick Askey.
4:00 p.m. Sarah Post*, Ian Marquette, Lisa Ritter
   Exceptional Orthogonal Polynomials and rational solutions of Painlevé Equations.
4:30 p.m. Bruce C. Berndt*
   Ramanujan’s Beautiful Integrals.
5:00 p.m. Shaun Cooper*
   Some elliptic integrals in Ramanujan’s lost notebook.
5:30 p.m. Mourad E. H. Ismail*
   Mathematical Reminisce about Dick Askey.

Topic #6  _____  OP – SF Net 27.6  _____  November 15, 2020

From: Tom Koornwinder (thkmath@xs4all.nl)
Subject: Essay by Tom Koornwinder: Hendrik Lorentz and Harry Bateman

**Lorentz and Bateman**

by Tom Koornwinder

There are two ways by which the Dutch physicist Hendrik Antoon Lorentz (1853–1928) and the American, originally English, mathematician Harry Bateman (1882–1946) are scientifically related. Do you know which ones?
1. Lorentz and Bateman both figure on a group photo (see link and below) taken at Caltech, Pasadena in 1922 (see [1] for a photo of less quality, but with Bateman closer to Lorentz.). Lorentz is central in the row of those sitting on chairs and Bateman is fourth to the right from him. The group consists of the people attending Lorentz’ lecture course there. Bateman, who was a faculty member at Caltech, was charged with taking notes and sending a draft to Lorentz so that it could be published as a book. Already in May 1922 Bateman had done his job. Lorentz was very slow in making corrections and writing additions. He was burdened by administrative duties. The book was finally published in 1927: Problems of Modern Physics, a course of lectures delivered in the California Institute of Technology [2], see a review in [3]. If we remember Bateman mainly as the grandfather of handbooks on special functions, we may be surprised that he was assigned to prepare this book for Lorentz. But according to Erdélyi’s obituary [4] of Bateman, he had earlier done work on Maxwell equations which contained ideas of general relativity theory, independently of Einstein. So he may have been the best suitable person for taking notes.

2. After the flood of 1916, a law was passed in the Netherlands that a closure dam of the Zuiderzee (see old situation at [5] and new situation at [6]) should be built. In 1918, a committee of specialists was installed for preparing a final technical proposal for the construction of the dam. Lorentz became chairman. This turned out to be a major job since new theory had to be developed on how the tides would behave after the dam was built and how the dam should be in order to stand storm floods. Lorentz was the only person in this committee of hydraulic engineers who was able to develop such a theory. Even for him, the man who had completely understood Einstein’s general relativity theory in a few months after its publication in 1915, it was a tour de force. It took until 1926 before the committee published its report. At a certain stage Bessel functions entered in Lorentz’ research for this project. The hydraulic engineers were not familiar at all with these functions. Of course, Bateman knew these functions very well, but
probably he did not know that one of the reasons that he had to wait so long for the final version of the Caltech lecture notes, was that Lorentz was busy with Bessel functions. See the final report [7] (in Dutch); Bessel functions are introduced on p.232.

I found these facts from a recent biography of Lorentz (in Dutch). See a short description in English on [8].

References


[7] https://repository.tudelft.nl/islandora/object/uuid:f5a4fe20-b26a-4875-9f96-6be04ba16c59/datastream/OBJ1/download

The following preprints related to the fields of orthogonal polynomials and special functions were posted or cross-listed to one of the subcategories of arXiv.org during September and October 2020. This list has been separated into two categories.

**OP–SF Net Subscriber E–Prints**

Multi–integral representations for associated Legendre and Ferrers functions  
Howard S. Cohl, Roberto S. Costas–Santos

Generalized Bessel functions of dihedral–type: expression as a series of confluent Horn functions and Laplace–type integral representation  
Luc Deleaval, Nizar Demni

A Series Representation for Riemann’s Zeta Function and some Interesting Identities that Follow  
Michael Milgram

Uniformization and Constructive Analytic Continuation of Taylor Series  
Ovidiu Costin, Gerald V. Dunne

Dunkl intertwining operator for symmetric groups  
Hendrik De Bie, Pan Lian

Self–similar potentials in quantum mechanics and coherent states  
V. P. Spiridonov

Resolving singularities and monodromy reduction of Fuchsian connections  
Yik–Man Chiang, Avery Ching, Chiu–Yin Tsang

Refined Wilf–equivalences by Comtet statistics  
Shishuo Fu, Zhicong Lin, Yaling Wang

Sharp error bounds for turning point expansions  
T. M. Dunster, A. Gil, J. Segura

The elliptic function $dn_2$ of Shen  
P.L. Robinson
Comments on the paper “Universal bounds and monotonicity properties of ratios of Hermite and Parabolic Cylinder functions”
Javier Segura

A unified algebraic underpinning for the Hahn polynomials and rational functions
Luc Vinet, Alexei Zhedanov

Definition and properties of logopoles of all degrees and orders
Matt Majic, Eric C. Le Ru

Perfect state transfer in two dimensions and the bivariate dual–Hahn polynomials
Hiroshi Miki, Satoshi Tsujimoto, Luc Vinet

On discrete coherent pairs of measures
R. Álvarez–Nodarse, K. Castillo, D. Mbouna, J. Petronilho

Hypergeometric identities in elliptic signature six
P.L. Robinson

Gauss hypergeometric representations of the Ferrers function of the second kind
Howard S. Cohl, Justin Park, Hans Volkmer

Stokes phenomenon arising in the confluence of the Gauss hypergeometric equation
Calum Horrobin, Marta Mazzocco

Airy process with wanderers, KPZ fluctuations, and a deformation of the Tracy–Widom GOE distribution
Karl Liechty, Gia Bao Nguyen, Daniel Remenik

Differentiation of the Wright functions with respect to parameters and other results
Alexander Apelblat, Francesco Mainardi

Convergence Rates of Exceptional Zeros of Exceptional Orthogonal Polynomials
Brian Simanek

Twisted traces and positive forms on quantized Kleinian singularities of type A
Pavel Etingof, Daniil Klyuev, Eric Rains, Douglas Stryker

Positivity of Turán determinants for orthogonal polynomials II
Ryszard Szwarc
Multivariate Lagrange interpolation and polynomials of one quaternionic variable
Shayne Waldron

Finite-dimensional representations of the symmetry algebra of the dihedral Dunkl–Dirac operator
Hendrik De Bie, Alexis Langlois-Rémillard, Roy Oste, Joris Van der Jeugt

Exact solution of the position-dependent effective mass and angular frequency Schrödinger equation: harmonic oscillator model with quantized confinement parameter
E.I. Jafarov, S.M. Nagiyev, R. Oste, J. Van der Jeugt

Proofs for certain conjectures of Gosper on $q$-trigonometric identities
Bing He

Inequalities for Taylor series involving the divisor function
Horst Alzer, Man Kam Kwong

Uniform asymptotic expansions for solutions of the parabolic cylinder and Weber equations
T. M. Dunster

Expanding the quasisymmetric Macdonald polynomials in the fundamental basis
Sylvie Corteel, Olya Mandelshtam, Austin Roberts

Orthogonal functions related to Lax pairs in Lie algebras
Wolter Groenevelt, Erik Koelink

On $\beta = 6$ Tracy–Widom distribution and the second Calogero–Painlevé system
Alexander Its, Andrei Prokhorov

Airy kernel determinant solutions to the KdV equation and integro–differential Painlevé equations
Mattia Cafasso, Tom Claeys, Giulio Ruzza

Discrete index transformations with squares of Bessel functions
Semyon Yakubovich

Correlation Functions for a Chain of Short Range Oscillators
Guido Mazzuca, Tamara Grava, Thomas Kriecherbauer, Ken D. T.–R. McLaughlin
An explicit example of polynomials orthogonal on the unit circle with a dense point spectrum generated by a geometric distribution
Alexei Zhedanov

Higher Order Coercive Inequalities
Yifu Wang, Boguslaw Zegarlinski

A note on an asymptotic formula for integrals of products of Jacobi polynomials
Maxim Derevyagin, Nicholas Juricic

Uniform (very) sharp bounds for ratios of Parabolic Cylinder functions
Javier Segura

Determinant of $\Gamma_p$-hypergeometric solutions under ample reduction
Alexander Varchenko

Asymptotic properties of short–range interaction functionals
Douglas Hardin, Edward B. Saff, Oleksandr Vlasiuk

Almost all entries in the character table of the symmetric group are multiples of any given prime
Sarah Peluse, Kannan Soundararajan

Proofs of two conjectures on the real zeros of the cylinder and Airy functions
Gergő Nemes

$q$–Analogues of some supercongruences related to Euler numbers
Victor J. W. Guo

A proof of the mod 4 unimodal sequence conjectures and related mock theta functions
Rong Chen, Frank Garvan

Representations of degenerate Hermite polynomials
Taekyun Kim, Dae San Kim, Lee–Chae Jang, Hyunseok Lee, Hanyoung Kim

Bernoulli–Fibonacci Polynomials
Oktay K. Pashaev, Merve Ozvatan

Partition–theoretic formulas for arithmetic densities, II
Ken Ono, Robert Schneider, Ian Wagner
A Note on Generalized $q$–Difference Equations and Their Applications Involving $q$–Hypergeometric Functions
Hari Mohan Srivastava, Jian Cao, Sama Arjika

Ladder operators and hidden algebras for shape invariant nonseparable and nondiagonalizable models with quadratic complex interaction. II. Three–dimensional model
Ian Marquette, Christiane Quesne

On a result of Koecher concerning Markov–Apéry type formulas for the Riemann zeta function
Karl Dilcher, Christophe Vignat

When are the roots of a polynomial real and distinct? A graphical view
David W. Farmer

Other Relevant OP–SF E–Prints

Realization by a differential operator of the annihilation operator for generalized Chebyshev oscillator
V.V. Borzov, E.V. Damaskinsky

An Explicit Upper Bound for $|\zeta(1 + it)|$
Dhir Patel

The geometry of generalized Lame equation, III: One–to–one of the Riemann–Hilbert correspondence
Zhijie Chen, Ting–Jung Kuo, Chang–Shou Lin

Limit theorems and soft edge of freezing random matrix models via dual orthogonal polynomials
Sergio Andraus, Kilian Hermann, Michael Voit

Selberg’s zeta function for the modular group in the critical strip
Yasufumi Hashimoto

Optimal approximants and orthogonal polynomials in several variables II: families of polynomials in the unit ball
Meredith Sargent, Alan A. Sola

Uniform pointwise estimates for ultraspherical polynomials
Valentina Casarino, Paolo Ciatti, Alessio Martini
The recurrence formulas for primes and non-trivial zeros of the Riemann zeta function
Artur Kawalec

Convolution operators via orthogonal polynomials
Maksim Kukushkin

Weighted spectral cluster bounds and a sharp multiplier theorem for ultraspherical Grushin operators
Valentina Casarino, Paolo Ciatti, Alessio Martini

Are the Stieltjes constants irrational? Some computer experiments
Krzysztof D. Maslanka, Marek Wolf

Relative Nash-type and $L^2$–Sobolev inequalities for Dunkl operators and applications
S. Mustapha, M. Sifi

Higher Order Apostol–Type Poly–Genocchi Polynomials with Parameters a, b and c
Cristina B. Corcino, Roberto B. Corcino

Some Formulae of Genocchi Polynomials of Higher Order
Cristina B. Corcino, Roberto B. Corcino, Joy Ann A. Canete

$qRS_t$: A probabilistic Robinson–Schensted correspondence for Macdonald polynomials
Florian Aigner, Gabriel Frieden

Families of eulerian functions involved in regularization of divergent polyzetas
V.C. Bui, V. Hoang Ngoc Minh, Q.H. Ngo

Extreme values for iterated integrals of the logarithm of the Riemann zeta–function
Shōta Inoue

Truncated $t$–adic symmetric multiple zeta values and double shuffle relations
Masataka Ono, Shin–ichiro Seki, Shuji Yamamoto

The many faces of the stochastic zeta function
Benedek Valkó, Bálint Virág

Moments of Generalized Cauchy Random Matrices and continuous–Hahn Polynomials
Theodoros Assiotis, Benjamin Bedert, Mustafa Alper Gunes, Arun Soor
On a distinguished family of random variables and Painlevé equations
Theodoros Assiotis, Benjamin Bedert, Mustafa Alper Gunes, Arun Soor

Polar harmonic Maass forms and holomorphic projection
Joshua Males, Andreas Mono, Larry Rolen

Strong approximation of Gaussian $\beta$-ensemble characteristic polynomials: the edge regime and
the stochastic Airy function
Gaultier Lambert, Elliot Paquette

A local Theory of Domains and its (Noncommutative) Symbolic Counterpart
V.C. Bui, G.H.E. Duchamp, V. Hoang Ngoc Minh, Q.H. Ngo, K. Penson

A harmonic sum over nontrivial zeros of the Riemann zeta-function
Richard P. Brent, David J. Platt, Timothy S. Trudgian

Asymptotic evaluation of a lattice sum associated with the Laplacian matrix
Arzu Boysal, Fatih Ecevit, Cem Yalçın Yıldırım

Balancing Polynomials in the Chebyshev Norm
Victor Reis

Several new product identities in relation to two-variable Rogers–Ramanujan type sums and mock
theta functions
Alexandru Pascadi

Seesaw Identities and Theta Contractions with Generalized Theta Functions, and Restrictions of
Theta Lifts
Shaul Zemel

Algebraic independence of certain infinite products involving the Fibonacci numbers
Daniel Duverney, Yohei Tachiya

A family of Exponential Integrals suggested by Stellar Dynamics
Luca Ciotti

Rational values of powers of trigonometric functions
Genki Shibukawa
On a nonlinear relation for computing the overpartition function
Mircea Merca

Discriminants of cubic curves and determinantal representations
Manh Hung Tran

An introduction to the Bernoulli function
Peter H. N. Luschny

Airy Point Process via Supersymmetric Lifts
Andrew Ahn

Generalized hypergeometric expansion related to the Hurwitz zeta function
Alexander Adam

Bergman–Szegő kernel asymptotics in weakly pseudoconvex finite type cases
Chin–Yu Hsiao, Nikhil Savale

Theta functions, fourth moments of eigenforms, and the sup–norm problem I
Ilya Khayutin, Raphael S. Steiner

Asymptotics of Fundamental Solution of Cauchy Problem for Parabolic Equation with Small Parameter and Degeneration
Mark Rakhel

Yang–Baxter $R$–operators for $osp$ superalgebras
A.P. Isaev, D. Karakhanyan, R. Kirschner

A pair correlation problem, and counting lattice points with the zeta function
Christoph Aistleitner, Daniel El–Baz, Marc Munsch

Moments and hybrid subconvexity for symmetric–square $L$–functions
Rizwanur Khan, Matthew P. Young

The Ruelle zeta function at zero for nearly hyperbolic 3–manifolds
Mihajlo Cekić, Semyon Dyatlov, Benjamin Küster, Gabriel P. Paternain

Lucas–Euler relations using balancing and Lucas–balancing polynomials
Robert Frontczak, Taras Goy
Schatten class Bergman–type and Szegő–type operators on bounded symmetric domains
Lijia Ding

Multiple zeta values and iterated Eisenstein integrals
Alex Saad

Coherent States of Systems with Pure Continuous Energy Spectra
Zouhair Mouayn, Hashim A. Yamani

Fibonacci polynomials
A. Garsia, G. Ganzberger

Orthogonal Die Random Measures, Primes, and Applications
Caleb Deen Bastian, Grzegorz A Rempala

New mixed recurrence relations of two–variable orthogonal polynomials via differential operators
Mosaed M. Makky, Mohammad Shadab

Relating certain weighted Fibonacci series to Bernoulli polynomials via the polylogarithm function
Kunle Adegoke

Dirichlet type extensions of Euler sums
Weiping Wang, Ce Xu

X–Ray of Zhang’s eta function
Jeffrey Stopple

The birth of the strong components
Élie de Panafieu, Sergey Dovgal, Dimbinaina Ralaivaosaona, Vonjy Rasendrahasinga, Stephan Wagner

Further study on the conformable fractional Gauss hypergeometric function
Mahmoud Abul–Ez, Mohra Zayed, Ali Youssef

Spectral invariants of convex billiard maps:a viewpoint of Mather’s beta function
Jianlu Zhang

Real zeros of the Barnes double zeta function
Kazuma Sakurai
Time dependent rationally extended Pöschl–Teller potential and some of its properties
D. Nath, P. Roy

A remark on renormalization group theoretical perturbation in a class of ordinary differential equations
Atsuo Kuniba

Matrix orthogonality in the plane versus scalar orthogonality in a Riemann surface
Christophe Charlier

Mapping properties of the zero–balanced hypergeometric functions
Li–Mei Wang

Accurate estimation of sums over zeros of the Riemann zeta–function
Richard P. Brent, David J. Platt, Timothy S. Trudgian

Method of fundamental solutions for Neumann problems of the modified Helmholtz equation in disk domains
Shin–Ichiro Ei, Hiroyuki Ochiai, Yoshitaro Tanaka

An exceptional symmetry algebra for the 3D Dirac–Dunkl operator
Alexis Langlois–Rémillard, Roy Oste

Limit theorems for Bessel and Dunkl processes of large dimensions and free convolutions
Michael Voit, Jeannette H.C. Woerner

A Littlewood–Richardson rule for Koornwinder polynomials
Kohei Yamaguchi

Convergence of Ramanujan expansions, I
Giovanni Coppola, Luca Ghidelli

Orbifold partition function, pentagon identity and star–triangle relation
Deniz N. Bozkurt, Ilmar Grahmanov, Mustafa Mullahasanoglu

A generalization of Krull–Webster’s theory to higher order convex functions: multiple Γ–type functions
Jean–Luc Marichal, Naïm Zénaïdi
Sobolev Orthogonal Polynomials on the Sierpinski Gasket
Qingxuan Jiang, Tian Lan, Kasso Okoudjou, Robert Strichartz, Shashank Sule, Sreeram Venkat, Xiaoduo Wang

Novel Results of Two Generalized Classes of Fibonacci and Lucas Polynomials and Their Uses in the Reduction of Some Radicals
W.M. Abd-Elhameed, N.A. Zeyada, A.N. Philippou

The Fundamental Solution for the Heat Equation on the half-line with Drift and Dirichlet Boundary Condition
Tertuliano Franco, Patrícia Gonçalves, Nicolas Perkowski, Marielle Simon

Periods of Hodge cycles and special values of the hypergeometric function
Jorge Duque Franco

SymODE2: Symbolic analysis of second-order ordinary differential equations with polynomial coefficients
Tolga Birkandan

Jet schemes, Quantum dilogarithm and Feigin–Stoyanovsky’s principal subspaces
Hao Li, Antun Milas

Zeta functions of Lie \( p \)-algebras and finite \( p \)-groups
Seungjae Lee

Tight bounds on the mutual coherence of sensing matrices for Wigner D–functions on regular grids
Arya Bangun, Arash Behboodi, Rudolf Mathar

Chebyshev polynomials and higher order Lucas Lehmer algorithm
Kok Seng Chua

On the Exact Distributions of the Maximum of the Asymmetric Telegraph Process
Fabrizio Cinque, Enzo Orsingher

Fractional truncated Laplacians: representation formula, fundamental solutions and applications
Isabeau Birindelli, Giulio Galise, Erwin Topp

Self–Bäcklund curves in centroaffine geometry and Lamé’s equation
Misha Bialy, Gil Bor, Serge Tabachnikov
Application of Bernoulli Polynomials for Solving Variable-Order Fractional Optimal Control-Affine Problems
Somayeh Nemati, Delfim F. M. Torres

A few properties of the ratio of Davenport–Heilbronn Functions
Tao Liu, Juhao Wu

Distribution evaluation of hypergeometric series
Ming Hao Zhao

Elementary Integral Series for Heun Functions. With an Application to Black-Hole Perturbation Theory
P.–L. Giscard, A. Tamar

Raising type twisted Pieri formulas for Jack polynomials and their applications to interpolation
Jack polynomials
Genki Shibukawa

On the deformation of linear Hamiltonian systems
Harald Schmid

A kernel-independent sum-of-Gaussians method by de la Vallée-Poussin sums
Jiuyang Liang, Zixuan Gao, Zhenli Xu

Entropy monotonicity and superstable cycles for the quadratic family revisited
José M. Amigó, Angel Giménez

On a class of canonical systems corresponding to matrix string equations: general-type and explicit fundamental solutions and Weyl-Titchmarsh theory
Alexander Sakhnovich

Horizontal and Vertical Log-Concavity
Bernhard Heim, Markus Neuhauser

All Complex Zeros of the Riemann Zeta Function Are on the Critical Line: Two Proofs of the Riemann Hypothesis
Roberto Violi

Duality of one-variable multiple polylogarithms and their $q$-analogues
Shuji Yamamoto
Weights, Kovalevskaya exponents and the Painlevé property
Hayato Chiba

Topological recursion and uncoupled BPS structures I: BPS spectrum and free energies
Kohei Iwaki, Omar Kidwai

Fractal zeta functions of orbits of parabolic diffeomorphisms
Pavao Mardešić, Goran Radunović, Maja Resman

A Chebyshev-Tau spectral method for normal modes of underwater sound propagation with a layered marine environment
Houwang Tu, Yongxian Wang, Qiang Lan, Wei Liu, Wenbin Xiao, Shuqing Ma

Arithmetic properties of Fourier coefficients of meromorphic modular forms
Steffen Löbrich, Markus Schwagenscheidt

Continuous window functions for NFFT
Daniel Potts, Manfred Tasche

Analytical parameter estimation of the SIR epidemic model. Applications to the COVID-19 pandemic
Dimiter Prodanov

A Series Representation of \( \zeta(m) \) Involving Root of Unity
Xiaowei Wang

Integrable Billiards on Pseudo–Euclidean Hyperboloids and Extremal Polynomials
Vladimir Dragovic, Sean Gasiorek, Milena Radnović

Formulas for coefficients of polynomials assigned to arithmetic functions
Bernhard Heim, Markus Neuhauser

Autocorrelation functions for quantum particles in supersymmetric Pöschl–Teller Potentials
Francesco Cellarosi

Characteristic determinant and Manakov triple for the double elliptic integrable system
A. Grekov, A. Zotov

An Involution on Semistandard Skyline Fillings
Neil J.Y. Fan, Peter L. Guo, Nicolas Y. Liu
Joint value–distribution of shifts of the Riemann zeta–function
Łukasz Pańkowski

Yangian Bootstrap for Massive Feynman Integrals
Florian Loebbert, Julian Miczajka, Dennis Müller, Hagen Münkler

A proof of Ibukiyama’s Shimura type conjecture on Siegel modular forms of half–integral weight
and of degree 2
Hiroshi Ishimoto

Painlevé type reductions for the non–Abelian Volterra lattices
V. E. Adler

On regularization of the Heun functions
Oleg V. Motygin

Linear Forms in Polylogarithms
Sinnou David, Noriko Hirata–Kohno, Makoto Kawashima

Non–Gaussian integrals and general hypergeometric functions
Alexander Roi Stoyanovsky

Hecke–Rogers double–sums and false theta functions
Eric T. Mortenson

Appell and Sheffer sequences: on their characterizations through functionals and examples
Sergio A. Carrillo, Miguel Hurtado

The Polylogarithm Function in Julia
Matthew Roughan

Higher Derivatives of the Tangent and Inverse Tangent Functions and Chebyshev Polynomials
M.J. Kronenburg

An exact solution to asymptotic Bethe equation
Yuan Miao

Where did the examples of Abel’s continuity theorem go?
Sergio A. Carrillo
Non–real zeros of polynomials in a polynomial sequence satisfying a three–term recurrence relation
Innocent Ndikubwayo

On derivatives, Riesz transforms and Sobolev spaces for Fourier–Bessel expansions
Bartosz Langowski, Adam Nowak

The number of zeros of linear combinations of $L$–functions near the critical line
Youness Lamzouri, Yoonbok Lee

A Sharp Isoperimetric Inequality for the Second Eigenvalue of the Robin Plate
L. Mercredi Chasman, Jeffrey J. Langford

Some explicit and unconditional results on gaps between zeroes of the Riemann zeta–function
A. Simonič, T. Trudgian, C. L. Turnage–Butterbaugh

On Ramanujan Sums of a Real Variable and a New Ramanujan Expansion for the Divisor Function
Matthew S. Fox, Chaitanya Karamchedu

Null Kähler geometry and isomonodromic deformations
Maciej Dunajski

Trans–Series Asymptotics of Solutions to the Degenerate Painlevé III Equation: A Case Study
A. Vartanian

Normal zeta functions of small $\mathfrak{S}_2$–groups and their behaviour on residue classes
Seungjai Lee

Dwork hypersurfaces of degree six and Greene’s hypergeometric function
Satoshi Kumabe

Gaussian Asymptotics of Jack Measures on Partitions from Weighted Enumeration of Ribbon Paths
Alexander Moll

On explicit estimates for $S(t)$, $S_1(t)$, and $\zeta(\frac{1}{2} + it)$ under the Riemann hypothesis
Aleksander Simonič
Convergence Acceleration via Chebyshev Step: Plausible Interpretation of Deep-Unfolded Gradient Descent
Satoshi Takabe, Tadashi Wadayama

Proof of some supercongruences concerning truncated hypergeometric series
Chen Wang, Dian-Wang Hu

The \( p \)-Airy distribution
Sergio Caracciolo, Vittorio Erba, Andrea Sportiello

A direct method for solving inverse Sturm–Liouville problems
Vladislav V. Kravchenko, Sergii M. Torba

Combinatorics of multisecant Fay identities
V.E. Vekslerchik

Discrete and continuous Muttalib–Borodin processes I: the hard edge
Dan Betea, Alessandra Occelli

Bailey–type factorizations for Horn functions
Carlo Verschoor

A Kronecker limit formula for indefinite zeta functions
Gene S. Kopp

\((p, q)\)-complex Itô–Hermite polynomials
Abdelhadi Benahmadi, Allal Ghanmi

Topic #8  -----  OP – SF Net 27.6  -----  November 15, 2020

From: OP–SF Net Editors
Subject: Submitting contributions to OP–SF NET and SIAM–OPSF (OP–SF Talk)

To contribute a news item to OP–SF NET, send e-mail to one of the OP–SF Editors howard.cohl@nist.gov, or spost@hawaii.edu.

Contributions to OP–SF NET 28.1 should be sent by January 1, 2021.

OP–SF NET is an electronic newsletter of the SIAM Activity Group on Special Functions and Orthogonal Polynomials. We disseminate your contributions on anything of interest to the special functions and orthogonal polynomials community. This includes announcements of conferences, forthcoming books, new software, electronic archives, research questions, and job openings as well as news about new appointments, promotions, research visitors, awards and prizes. OP–SF Net is transmitted periodically through a post to SIAM–OPSF (OP–SF Talk).
SIAM-OPSF (OP–SF Talk) is a listserv of the SIAM Activity Group on Special Functions and Orthogonal Polynomials, which facilitates communication among members, and friends of the Activity Group. See the previous Topic. To post an item to the listserv, send e-mail to siam-opsf@siam.org.

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http://math.nist.gov/opsf
Information on joining SIAM and this activity group: service@siam.org

The elected Officers of the Activity Group (2020–2022) are:
Peter Alan Clarkson, Chair
Luc Vinet, Vice Chair
Andrei Martínez-Finkelshtein, Program Director
Teresa E. Pérez, Secretary and OP–SF Talk moderator

The appointed officers are:
Howard Cohl, OP–SF NET co-editor
Sarah Post, OP–SF NET co-editor
Diego Dominici, OP–SF Talk moderator
Bonita Saunders, Webmaster and OP–SF Talk moderator

Topic #9  OP – SF Net 27.6  November 15, 2020

From: OP–SF Net Editors
Subject: Thoughts of the Month by Bertrand Russell

“It seems to me now that mathematics is capable of an artistic excellence as great as that of any music, perhaps greater ... because it gives in absolute perfection that combination, characteristic of great art, of godlike freedom, with the sense of inevitable destiny; because, in fact, it constructs an ideal world where everything is perfect and yet true.”


"One of the painful things about our time is that those who feel certainty are stupid, and those with any imagination and understanding are filled with doubt and indecision."