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The Electronic News Net of the
SIAM Activity Group on Orthogonal Polynomials and Special Functions

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Topics:

Calendar of Events:

September 18-22, 2017
Integrable systems, symmetries, and orthogonal polynomials
(Celebrating Peter Clarkson's and Liz Mansfield's 60th birthdays)
Instituto de Ciencias Matemáticas (ICMAT) Madrid, Spain.
https://www.icmat.es/RT/optrim/conference/index.php

October 23-27, 2017
II Orthonet School
Orthogonal polynomials and Special functions in Approximation Theory and Mathematical Physics, Madrid, Spain
https://www.icmat.es/RT/optrim/school/index.php

November 2-4, 2017
International Conference on Special Functions & Applications (ICSFA-2017)
Bikaner (Rajasthan), India
http://www.ssfaindia.webs.com/conf.htm

November 30–December 2, 2017

International Conference Approximation and Computation – Theory and Applications
(Dedicated to Professor Walter Gautschi on the Occasion of his 90th Anniversary)
Belgrade, Serbia
http://easychair.org/smart-program/ACTA2017/Home.html

January 10–13, 2018

2018 Joint Mathematics Meetings, American Mathematical Society,
San Diego Convention Center and San Diego Marriott Hotel and Marina, San Diego, CA, USA
http://jointmathematicsmeetings.org/meetings/national/jmm2018/2197_intro

AMS Special Session on Orthogonal Polynomials and Applications,
Organized by Abey Lopez-Garcia and Xiang-Sheng Wang

AMS Special Session on Orthogonal Polynomials, Quantum Probability, and Stochastic Analysis,
Organized by Julius N. Esunge and Aurel I. Stan

AMS Special Session on Special Functions and Combinatorics
(in honor of Dennis Stanton's 65th birthday),
Organized by Susanna Fishel, Mourad Ismail, and Vic Reiner

AMS Special Session on Algebraic, Analytic, and Geometric Aspects of Integrable Systems, Painlevé Equations, and Random Matrices,
Organized by Vladimir Dragovic, Anton Dzhamay, and Sevak Mkrtchyan,

January 29–February 2, 2018

Partition Functions and Automorphic Forms
Bogoliubov Laboratory of Theoretical Physics, JINR, Dubna, Russia
http://indico.jinr.ru/event/diastp/Winter2018

November 11–17, 2018

Symmetries and Integrability of Difference Equations (SIDE13:2018)
Fukuoka, Japan
http://side-conferences.net

Summer, 2019

OPSFA 15 International Symposium
Linz, Austria

Topic #1 ——— OP – SF Net 24.5 ——— September 15, 2017

From: Vyacheslav Spiridonov (spiridon@theor.jinr.ru)
Subject: "Partition Functions and Automorphic Forms" at Dubna, Russia

Bogoliubov Laboratory of Theoretical Physics, JINR (Dubna) and International Laboratory for Mirror Symmetry and Automorphic Forms, NRU HSE (Moscow) are organizing an international winter school "Partition Functions and Automorphic Forms".

The school will take place at BLTP JINR (Dubna, Russia) from January 29 to February 2, 2018 in the framework of the program DIAS-TH.

The scientific coordinators are V. A. Gritsenko and V. P. Spiridonov. The registration to the school is open on the website: http://indico.jinr.ru/event/diastp/Winter2018.

Topic #2 ——— OP - SF Net 24.5 ——— September 15, 2017

From: S. Ahmad Ali, Member, ICSFA-2017 Committee (ssfaindia@gmail.com)
Subject: "International Conf. on Special Functions & Applications" at Bikaner, India

I am pleased to announce that the 16th Annual Meeting of the Society for Special Functions & their Applications (SSFA) - International Conference on Special Functions & Applications (ICSFA-2017) is being organized by the Department of Mathematics, College of Engineering & Technology, Bikaner (Rajasthan), India, during November 2-4, 2017. The academic programs of the conference shall consist of plenary sessions, invited talks and paper presentations covering a wide range of topics in special functions and related areas. A symposium on the application of mathematical sciences in engineering problems shall be organized during the conference.

Important Dates:

- 15 September 2017: Last date for submission of a paper for the A. K. Agarwal Best Publication Award.
- 20 September 2017: Last date for nomination of the A. M. Mathai Research Excellence Award.
- 30 September 2017: Last date for submission of abstracts/full length papers for presentation or submission of papers for the Aruna Gupta and M. I. Qureshi Best Presentation Awards.
- 10 October 2017: Last date for registration.
- 15 January 2018: Last date for submission of papers for conference proceedings.

The SSFA and the Organizing Committee - ICSFA-2017 cordially invites you to participate in the conference. The conference details are available at:

http://www.ssfaindia.webs.com/conf.htm

We also request that you to circulate the conference information to your colleagues, friends and research scholars interested in the field of special functions and their applications in diverse areas of research.

Looking forward to your active participation for the success of ICSFA-2017.

Topic #3 ——— OP - SF Net 24.5 ——— September 15, 2017

From: Galina Filipuk (filipuk@mimuw.edu.pl)
Subject: Volume: "Analytic, Algebraic and Geometric Aspects of Differential Equations"

"Analytic, Algebraic and Geometric Aspects of Differential Equations"
Editors: Filipuk, Galina, Haraoka, Yoshishige, Michalik, Sławomir
Będlewo, Poland, September, 2015
Trends in Mathematics, Birkhäuser, 2015.
Web Site

We would like to announce the publication of a recent volume, "Analytic, Algebraic and Geometric Aspects of Differential Equations," that may be of interest to the SIAG/OPSF activity group members. These lecture notes, survey papers, and original research articles from the AAGADE school and conference held in Będlewo, Poland in September, 2015 provide an introduction and overview of the interaction between these different aspects (analytic, algebraic and geometric) of differential equations as well as a discussion of recent trends and open problems.

The collection includes lecture notes of Jean-Philippe Anker on "An introduction to Dunkl theory and its analytic aspects" as well as papers concerning Painlevé equations by Nalini Josh, "On Stokes Phenomena for the Alternate Discrete PI Equation" and Mitsuo Kato "Flat Structures and Algebraic Solutions to Painlevé VI Equation." Semi-classical orthogonal polynomials and their connection with nonlinear differential equations are discussed in "Relation of Semi-Classical Orthogonal Polynomials to General Schlesinger Systems via Twistor Theory" by Hironobu Kimura.

More information, including a complete list of contents is available at the following link: http://www.springer.com/gp/book/9783319528410.

Topic #4 ——— OP - SF Net 24.5 ——— September 15, 2017

From: Martin Muldoon (muldoon@yorku.ca)
Subject: Review of Beals & Wong, "Special Functions and Orthogonal Polynomials"

Review of Richard Beals and Roderick Wong,
"Special functions and Orthogonal Polynomials",
Cambridge Studies in Advanced Mathematics 153,
Cambridge University Press, 2016. xiii+473 pp.
ISBN: 978-1-107-10698-7.
Web Site

This book is essentially a revision of the authors' "Special Functions - a Graduate Text", published as vol. 126 in the same series in 2010, and reviewed in Topic #6, OP-SF NET 18.5, 2011. The material on Orthogonal Polynomials has been extended from 2 to 4 chapters, there is more material on asymptotics and there are new chapters on generalized hypergeometric functions (including Meijer G-functions) and Painlevé Transcendents. The chapter summaries, that formed a prominent feature of the earlier book, are not included. However, the Remarks (including historical and expository references) are still a feature of each Chapter as are the Exercises (more than 400) that sometimes involve steps in the proofs of theorems. There are references to 449 books and articles - up from 322 in the earlier book.

Wong's earlier research has been largely devoted to asymptotics including the book "Asymptotic Approximations of Integrals" (1989), republished on the SIAM "Classics in Applied Mathematics" series in 2001. Some of Beals' earlier work is described in his article "PDE and Special Functions" in a volume dedicated to Yakar Kannai. This article goes a long way to explaining why the present book has a chapter on generalized hypergeometric functions and G-functions.

The authors of any textbook face choices when deciding on content, motivation and arrangement of material. In the present case, the authors devote particular care to these issues, calling them “Organising Principles”. They write that their main goals are to “provide clear motivation, efficient proofs, and original references for all the principal results” and “This book emphasizes general principles that unify and demarcate the subjects of study”. This point of view influences the content, exercises, and references. While other books use such principles, it is rare to find them so central and explicit.

For example, in Chapter 1 “Orientation”, the authors raise three questions:

- How can it be that so many of the functions (mentioned in the introduction) can be associated with just two differential equations (confluent hypergeometric and hypergeometric)?
- What does one want to know about these functions?
- Is this list of functions or related equations exhaustive in any sense?

Already in Section 1.1, they explain the idea of recursiveness of a second order linear differential equation, the idea that it can be solved in a simple way using power series. This leads in a natural way to the two kinds of equations mentioned in the first question. Later (Chapter 3) the classical orthogonal polynomials are explained as the ones that arise when the eigenvalues of a certain kind of second order differential equation are polynomials.

The end-of-chapter remarks include information on the history of the topics considered. But the authors remark on p. 15, “There is much that could be said for proceeding historically ... but we shall not make a point of doing so ... later expositions can often be made more efficient ... and ... more transparent than the original derivations.”

Although the book will probably be mainly used as a graduate level textbook, many of its ideas and approaches can be useful at the undergraduate level and even at the research level.

Contents:

Topic #5 ——— OP – SF Net 24.5 ——— September 15, 2017

From: Eric Shirley (eric.shirley@nist.gov)
Subject: Comments on OPSFA-14 at the University of Kent

I enjoyed attending OPSFA-14 for a variety of reasons, mostly related to applicability of other researchers' results to my own work. This included automated algorithms for determining points and weights for Gaussian cubature (i.e., quadrature in more than one dimension, analysis of the stability of numerical grid-based methods to solve partial differential equations, and a robust tutorial (by means of very many lectures) on the theory of orthogonal polynomials. Regarding quadrature techniques, which are an especially important class of methods in Green's function-based methods, integration over polygons and hyperspheres were of particular interest.

I was also very impressed by the advances in the areas of the Painlevé equations and exceptional orthogonal polynomials. Both of these topics may be of interest in upcoming advances in physics, including in the field of quantum information. For this reason, I would recommend that applied physical scientists consider attending future conferences in the same series. The potential for interdisciplinary collaborations between physical scientists and applied mathematicians is particularly alluring.

The conference was well run, being housed in a new building devoted to mathematical sciences at the University of Kent. It featured an enjoyable public lecture related to medical imaging, emphasizing the benefits of robust applied mathematical theory in a way that was accessible to non-specialists. Overall, the venue of Canterbury was attractive, and the mood of the conference could be described best, perhaps, in one word: festive.

Topic #6 ——— OP – SF Net 24.5 ——— September 15, 2017

From: OP-SF NET Editors
Subject: Special issue on OPSFA in the journal SIGMA

The journal Symmetry, Integrability and Geometry: Methods and Applications (SIGMA) (ISSN 1815-0659) is publishing a special issue on "Orthogonal Polynomials, Special Functions and Applications (OPSFA14)".

The Guest Editors for this special issue are:

- Peter Clarkson (University of Kent at Canterbury, UK)
- Erik Koelink (Radboud University Nijmegen, The Netherlands)
- Ana Loureiro (University of Kent at Canterbury, UK)
- Walter Van Assche (University of Leuven, Belgium)

The deadline for paper submissions is January 31, 2018.

More information on this special issue and the submission procedure can be found at http://www.emis.de/journals/SIGMA/OPSFA2017.html.

Topic #7 ——— OP - SF Net 24.5 ——— September 15, 2017

From: Michael Schlosser (michael.schlosser@univie.ac.at)
Subject: Special issue on Elliptic Hypergeometric Functions in the journal SIGMA

We would like to remind you about the Special Issue of the journal SIGMA (Symmetry, Integrability and Geometry: Methods and Applications) on Elliptic Hypergeometric Functions and Their Applications.

The Guest Editors for this special issue are:

- Michael J. Schlosser (University of Vienna, Austria)
- Vyacheslav P. Spiridonov JINR, Dubna, Russia)
- S. Ole Warnaar (University of Queensland, Australia)

The deadline for submission of papers has been extended to January 31, 2018.

Both original research articles and review papers are welcome.

For further details, please see: https://www.emis.de/journals/SIGMA/EHF2017.html.

Feel free to contact the guest editors if you have any questions.

Topic #8 ——— OP - SF Net 24.5 ——— September 15, 2017

From: Walter van Assche (walter.vanassche@kuleuven.be)
Subject: Orthogonal polynomials associated with nonconventional potentials

Introduction: *We often have the impression that all the important orthogonal polynomials are known, at least those that appear in applications, but now and then a new family is encountered and little is known about them. The OPSF Newsletter is a good place to mention this and to invite people to have a look at them, thereby bringing researchers in OPSF together and opening possibilities for international collaboration.*

One prime example was brought to my attention recently by researchers from Saudi Arabia, and I asked the OP-SF NET Editors to include it as a topic in this newsletter. The problem is to derive properties of two new orthogonal polynomials on the real line that were overlooked in the mathematics literature, but have been encountered frequently in the physics literature since 2005. Currently, they are defined by their three-term recursion relations and initial values. If you are able to work out some of the relevant properties of these orthogonal polynomials, then please contact the author.

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Physical Background:

The wavefunction in quantum mechanics could be viewed as a vector field in an infinite dimensional space with local unit vectors. Thus, in one of the formulations of quantum mechanics, the wavefunction at an energy E, $\psi_E(x)$, is written as a bounded sum over a complete set of square integrable basis functions (the local unit vectors) in configuration space:

$$|\psi_E(x)\rangle = \sum_n f_n(E)|\phi_n(x)\rangle, \tag{1}$$

where $\{\phi_n(x)\}$ are the basis elements and $\{f_n(E)\}$ are proper expansion coefficients in the energy (the components of the wavefunction along the unit vectors). All physical information (structural and dynamical) are contained in the expansion coefficients. In this formulation, called the "Tridiagonal Representation Approach" [1-4], the basis elements are chosen such that the matrix representation of the wave operator (e.g., the Schrödinger or Dirac operator) is tridiagonal. Consequently, the resulting matrix wave equation becomes a three-term recursion relation for the expansion coefficients, which is solved in terms of orthogonal polynomials in some physical parameter(s) and/or the energy. We write $f_n(E) = f_0(E)P_n(\varepsilon)$, where ε is an appropriate function of the energy and physical parameters. Then, we have shown that $\{P_n(\varepsilon)\}$ is a complete set of orthogonal polynomials satisfying the said recursion relation with $P_0(\varepsilon) = 1$ and having a positive weight function as $|f_0(E)|^2$. These polynomials are associated with the continuum scattering states of the system where E is a continuous set. On the other hand, the discrete bound states are associated with the discrete version of these polynomials.

We found all such polynomials that correspond to well-known physical systems and to new ones. For example, the scattering states of the Coulomb problem are associated with Meixner-Pollaczek polynomial whereas the bound states are associated with its discrete version, the Meixner polynomial. Additionally, the scattering states of the Morse oscillator are associated with the continuous dual Hahn polynomial whereas the finite number of bound states are associated with its discrete version, the dual Hahn polynomial. And so on.

Nonetheless, since 2005 we did encounter physical problems that are associated with orthogonal polynomials, which were not treated in the mathematics or physics literature in the past [5-12]. These are defined, up to now, by their three-term recursion relations and initial value $P_0(\varepsilon) = 1$. However, their other important properties are yet to be derived analytically. These include the weight functions, generating functions, asymptotics, orthogonality relation, etc. The target polynomials are the two defined below.

The first polynomial:

The first orthogonal polynomial is a four-parameter polynomial, which we designate as $H_n^{(\mu,\nu)}(z;\alpha,\theta)$. It satisfies the following three-term recursion relation

$$\begin{aligned}
&(\cos\theta)H_n^{(\mu,\nu)}(z;\alpha,\theta)\\
&\quad= \left\{ z\sin\theta\left[\left(n+\frac{\mu+\nu+1}{2}\right)^2+\alpha\right]+\frac{\nu^2-\mu^2}{(2n+\mu+\nu)(2n+\mu+\nu+2)}\right\}H_n^{(\mu,\nu)}(z;\alpha,\theta)\\
&\qquad+\frac{2(n+\mu)(n+\nu)}{(2n+\mu+\nu)(2n+\mu+\nu+1)}H_{n-1}^{(\mu,\nu)}(z;\alpha,\theta)\\
&\qquad+\frac{2(n+1)(n+\mu+\nu+1)}{(2n+\mu+\nu+1)(2n+\mu+\nu+2)}H_{n+1}^{(\mu,\nu)}(z;\alpha,\theta),
\end{aligned} \tag{2}$$

where $n = 1, 2, ...$ and $0 \le \theta \le \pi$. It is a polynomial of degree n in z and in α. From physical arguments, we expect that μ and ν be greater than -1 and $z \in \mathbb{R}$. The polynomial of the first kind satisfies this recursion relation together with $H_0^{(\mu,\nu)}(z;\alpha,\theta)=1$ and

$$H_1^{(\mu,\nu)}(z;\alpha,\theta)=\frac{\mu-\nu}{2}+\frac{\mu+\nu+2}{2}\left\{\cos\theta-z\sin\theta\left[\frac{(\mu+\nu+1)^2}{4}+\alpha\right]\right\}, \tag{3}$$

which is obtained from (2) by setting $n=0$ and $H_{-1}^{(\mu,\nu)}(z;\alpha,\theta)\equiv 0$. This polynomial has only a continuous spectrum over the whole real z line. This could be verified numerically by looking at the distribution of its zeros for a very large order. The asymptotics $(n\to\infty)$ of $H_n^{(\mu,\nu)}(z;\alpha,\theta)$ could also be obtained numerically and found to be sinusoidal, which is consistent with the expected physical behavior. Additionally, the physics of the problems associated with this polynomial suggests that it should have two discrete versions (defined by the replacements $\theta\to i\theta$ and $z\to -iz$ in the above recursion relation). One with an infinite spectrum (for $\alpha>0$) and another with a finite spectrum (for $\alpha<0$). This is similar to the Meixner-Pollaczek polynomial and its discrete versions of the Meixner and Krawtchouk polynomials with infinite and finite spectra, respectively.

The second polynomial:

The second orthogonal polynomial is a three-parameter polynomial designated as $G_n^{(\mu,\nu)}(z^2;\sigma)$. It satisfies the following there-term recursion relation for $n=1,2,...$

$$\begin{aligned}
&z^2G_n^{(\mu,\nu)}(z^2;\sigma)\\
&=\left\{(\sigma+B_n^2)\left[\frac{\mu^2-\nu^2}{(2n+\mu+\nu)(2n+\mu+\nu+2)}+1\right]-\frac{2n(n+\nu)}{(2n+\mu+\nu)}-\frac{(\mu+1)^2}{2}\right\}G_n^{(\mu,\nu)}(z^2;\sigma)\\
&\qquad-\frac{2(\sigma+B_{n-1}^2)(n+\mu)(n+\nu)}{(2n+\mu+\nu)(2n+\mu+\nu+1)}G_{n-1}^{(\mu,\nu)}(z^2;\sigma)\\
&\qquad-\frac{2(\sigma+B_n^2)(n+1)(n+\mu+\nu+1)}{(2n+\mu+\nu+1)(2n+\mu+\nu+2)}G_{n+1}^{(\mu,\nu)}(z^2;\sigma),
\end{aligned} \tag{4}$$

where $B_n=n+1+\frac{\mu+\nu}{2}$, and $\{\mu,\nu\}$ are greater than -1. It is a polynomial of degree n in z^2. The polynomial of the first kind satisfies this recursion relation with $G_0^{(\mu,\nu)}(z^2;\sigma)=1$ and

$$G_1^{(\mu,\nu)}(z^2;\sigma)=\mu+1-(\mu+\nu+2)\frac{z^2+\frac{1}{2}(\mu+1)^2}{2(\sigma+B_0^2)}. \tag{5}$$

which is obtained from (4) by setting $n=0$ and $G_{-1}^{(\mu,\nu)}(z^2;\sigma)\equiv 0$. The physics of the problems associated with this polynomial suggests that if σ is positive then this polynomial has only a continuous spectrum on the positive z^2 line. However, if σ is negative then the spectrum is a mix of a continuous part on the positive z^2 line and a discrete part on the negative z^2 line. This could also be verified numerically by looking at the distribution of the zeros of this polynomial for a very large order. We can also show numerically that the asymptotics $(n\to\infty)$ is sinusoidal and assumes the following form

$$G_n^{(\mu,\nu)}(z^2;\sigma)\approx\frac{1}{n}A(z)\cos\left[\log(n)\theta(z)+\delta(z)\right], \tag{6}$$

where the three functions $A(z)$, $\theta(z)$ and $\delta(z)$ are independent of n but depend on the polynomial parameters $\{\sigma,\mu,\nu\}$. The well-known energy spectrum of the physical problems associated with this polynomial gives its spectrum formula as

$$z_m^2=-2\left(m+\frac{\nu+1}{2}-\sqrt{-\sigma}\right)^2, \tag{7}$$

where $m = 0, 1, \ldots, N$ and N is the largest integer less than or equal to $\sqrt{-\sigma} - \frac{\nu+1}{2}$. Therefore, the zeros of the scattering amplitude $A(z)$ in the asymptotic formula (6) are at $z = i\sqrt{-z_m^2}$. Consequently, the orthogonality relation for negative σ reads as follows

$$\int_0^\infty \rho(z) G_n^{(\mu,\nu)}(z^2;\sigma) G_m^{(\mu,\nu)}(z^2;\sigma) dz + \sum_{k=0}^{N} \omega_k G_n^{(\mu,\nu)}(z_k^2;\sigma) G_m^{(\mu,\nu)}(z_k^2;\sigma) = \lambda_n \delta_{m,n}, \tag{8}$$

where $\rho(z)$ is the continuous weight function, ω_k is the discrete weight function and $\lambda_n > 0$. For positive σ, however, only the integral part of this orthogonality survives. Moreover, the physics of the problems associated with this polynomial suggest that it has a discrete version with finite spectrum.

References:

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[12] I. A. Assi, A. D. Alhaidari and H. Bahlouli, Solution of the spin and pseudo-spin symmetric Dirac equation in 1+1 space-time using the tridiagonal representation approach, arXiv:1707.05625 [hep-th]

Topic #9 ——— OP - SF Net 24.5 ——— September 15, 2017

From: OP-SF Net Editors
Subject: Preprints in arXiv.org

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 July and August 2017. This list has been separated into two categories.

OP-SF Net Subscriber E-Prints

http://arxiv.org/abs/1707.00430
Spatial asymptotics of Green's function for elliptic operators and applications: a.c. spectral type, wave operators for wave equations
Sergey A. Denisov

http://arxiv.org/abs/1707.00897
Factorizations of symmetric Macdonald polynomials
Laura Colmenarejo, Charles F. Dunkl, Jean-Gabriel Luque

http://arxiv.org/abs/1707.01616
A continuous analogue of lattice path enumeration
T. Wakhare, C. Vignat, Q.-N. Le, S. Robins

http://arxiv.org/abs/1707.01734
An inverse factorial series for a general gamma ratio and related properties of the Nørlund-Bernoulli polynomials
Dmitrii B. Karp, Elena G. Prilepkina

http://arxiv.org/abs/1707.01737
q-Viscous Burgers' Equation: Dynamical Symmetry, Shock Solitons and q-Semiclassical Expansion
Sengul Nalci Tumer, Oktay K. Pashaev

http://arxiv.org/abs/1707.01867
Jacobi matrices generated by ratios of hypergeometric functions
Maxim Derevyagin

http://arxiv.org/abs/1707.02417
On the derivatives $\partial^2 P_\nu(z)/\partial\nu^2$ and $\partial Q_\nu(z)/\partial\nu$ of the Legendre functions with respect to their degrees
Radosław Szmytkowski

http://arxiv.org/abs/1707.02615
Solutions of KZ differential equations modulo p
Vadim Schechtman, Alexander Varchenko

http://arxiv.org/abs/1707.03018
A Feynman integral in Lifshitz-point and Lorentz-violating theories in $R^D \oplus R^m$
R. B. Paris, M. A. Shpot

http://arxiv.org/abs/1707.03843
Hahn polynomials on polyhedra and quantum integrability
Plamen Iliev, Yuan Xu

http://arxiv.org/abs/1707.04379
Revisiting The Riemann Zeta Function at Positive Even Integers
Krishnaswami Alladi, Colin Defant

http://arxiv.org/abs/1707.04733
The general form of the Euler-Poisson-Darboux equation and application of transmutation method
Elina L. Shishkina, Sergei M. Sitnik

http://arxiv.org/abs/1707.04842
Large N expansions for the Laguerre and Jacobi β ensembles from the loop equations
Peter J. Forrester, Anas A. Rahman, Nicholas S. Witte

http://arxiv.org/abs/1707.04989
Liouville integrability of conservative peakons for a modified CH equation
Xiang-Ke Chang, Jacek Szmigielski

http://arxiv.org/abs/1707.05206
Umbral Methods and Harmonic Numbers
Giuseppe Dattoli, Bruna Germano, Silvia Licciardi, Maria Renata Martinelli

http://arxiv.org/abs/1707.07190
Introduction to Cluster Algebras. Chapters 4-5
Sergey Fomin, Lauren Williams, Andrei Zelevinsky

http://arxiv.org/abs/1707.07211
Nonintersecting Brownian bridges on the unit circle with drift
Robert Buckingham, Karl Liechty

http://arxiv.org/abs/1707.07927
Uniform asymptotics as a stationary point approaches an endpoint
Arran Fernandez, Athanassios S. Fokas, Euan A. Spence

http://arxiv.org/abs/1707.08138
Combinatorial and Arithmetical Properties of the Restricted and Associated Bell and Factorial Numbers
Victor H. Moll, José L. Ramirez, Diego Villamizar

http://arxiv.org/abs/1707.08175
Error bounds for the large-argument asymptotic expansions of the Lommel and allied functions
Gergő Nemes

http://arxiv.org/abs/1707.08929
A Koksma-Hlawka-Potential Identity on the d Dimensional Sphere and its Applications to Discrepancy
S. B. Damelin

http://arxiv.org/abs/1707.08942
An Extension of the Method of Brackets. Part 1
Ivan Gonzalez, Karen Kohl, Lin Jiu, Victor H. Moll

http://arxiv.org/abs/1707.09120
Counting Planar Eulerian Orientations
Andrew Elvey-Price, Anthony J Guttmann

http://arxiv.org/abs/1707.09477
A variation on the theme of Nicomachus
Florian Luca, Geremías Polanco, Wadim Zudilin

http://arxiv.org/abs/1707.09511
What is ... a multiple orthogonal polynomial?
Andrei Martínez-Finkelshtein, Walter Van Assche

http://arxiv.org/abs/1708.00548
Liouville-Green expansions of exponential form, with an application to modified Bessel functions
T. M. Dunster

http://arxiv.org/abs/1708.01637
Matrix biorthogonal polynomials, associated polynomials and functions of the second kind
Amilcar Branquinho, Juan Carlos García-Ardila, Francisco Marcellán

http://arxiv.org/abs/1708.01638
Ratio asymptotic for bi-orthogonal matrix polynomials with unbounded recurrence coefficients
Amilcar Branquinho, Juan Carlos García-Ardila, Francisco Marcellán

http://arxiv.org/abs/1708.01957
Some Elementary Partition Inequalities and Their Implications
Alexander Berkovich, Ali K. Uncu

http://arxiv.org/abs/1708.02519
Asymptotics for Hankel determinants associated to a Hermite weight with a varying discontinuity
Christophe Charlier, Alfredo Deano

http://arxiv.org/abs/1708.02381
A magnetic double integral
David Broadhurst, Wadim Zudilin

http://arxiv.org/abs/1708.02868
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From: OP-SF Net Editors
Subject: Submitting contributions to OP-SF NET and SIAM-OPSF (OP-SF Talk)

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Thought of the month

“Legendre is an extremely amiable man, but unfortunately as old as the stones.”

Niels Henrik Abel, October, 1826. This was in response to Legendre’s refusal in 1824 to vote for the government’s candidate for the Institut National. As a result of Legendre’s refusal to vote for the government’s candidate in 1824 his pension was stopped and he died in poverty.