

OP-SF NET – Volume 30, Number 1 – January 15, 2023

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

<http://math.nist.gov/opsf>

OP-SF Net is distributed to OPSF Activity Group members and non-members alike through the OP-SF Talk listserv.

If you are interested in subscribing to the Newsletter and/or OP-SF Talk, or if you would like to submit a topic to the Newsletter or a contribution to OP-SF Talk, please send an email to the OP-SF Net Editors.

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Calendar of Events:

April 1–2 (Saturday–Sunday), 2023

2023 Spring Eastern Virtual Sectional Meeting, American Mathematical Society,
Associate Secretary for the AMS Scientific Program: Steven H. Weintraub, shw2@lehigh.edu.

AMS Special Session on Hypergeometric functions, q -Series and Adjacent Topics,
Organized by Howard Kohl, Robert Maier and Roberto S. Costas–Santos,
http://www.ams.org/meetings/sectional/2305_progfull.html

April 11–15, 2023

Workshop on Integrable Systems and Orthogonal Polynomials—Numerical
and Analytical Perspectives

AIMS South Africa, Muizenberg, Cape Town, South Africa

<https://aims.ac.za/event/workshop-on-integrable-systems-and-orthogonal-polynomials-numerical-and-analytical-perspectives/>

June 8–10, 2023

Orthogonal Polynomials and Applications

Leuven, Belgium.

<https://wis.kuleuven.be/events/conference-prof-walter-van-assche/orthogonal-polynomials-and-applications>

June 12–16, 2023

25th Conference of the International Linear Algebra Society (**ILAS2023**)

Minisymposium on Orthogonal Polynomials, Matrix Analysis and Applications

Organizers: Amilcar Branquinho, Ana Foulquié–Moreno, Manuel Mañas, Francisco Marcellán.

<https://ilas2023.es/>

June 12–21, 2023

Foundations of Computational Mathematics (FoCM 2023),

Sorbonne University, Paris, France

<https://focm2023.org/>

Workshops related to our SIAG:

Session II.5, June 15–17, 2023: **Random Matrices**

Organizers: Ioana Dumitriu, University of Washington, Sheehan Olver, Imperial College

Session III.2, June 19–21, 2023: **Approximation Theory**

Organizers: Albert Cohen, Sorbonne Université

Peter Binev, University of South Carolina, Guergana Petrova, Texas A&M University

Session III.7, June 19–21, 2023: **Special Functions and Orthogonal Polynomials**

Organizers: Ana Loureiro, University of Kent,

Paco Marcellán, Universidad Carlos III de Madrid,

Andrei Martínez–Finkelshtein, Baylor University and Universidad de Almería.

June 21–24, 2023

International Mathematical Conference: Analysis, Approximation, Applications (**AAA2023**)

Dedicated to [Gradimir V. Milovanović](#) on the occasion on his 75th birthday

[Hotel LiderS](#), Vrnjačka Banja, Serbia.

<https://imi.pmf.kg.ac.rs/aaa2023/>

June 24–28, 2024

17th International Symposium on Orthogonal Polynomials, Special Functions and Applications
(OPSFA–17),

Universidad de Granada, Granada, Spain.

Topic #1 ——— OP – SF Net 30.1 ——— January 15, 2023

From: Peter Clarkson (P.A.Clarkson@kent.ac.uk)

Subject: Message from the Chair

Happy New Year!

As we move into 2023, indeed well into the first month now, we have to hope that the situation means that academic activities assume a form of reality after the challenges of the pandemic in the past three years. I suspect there will be a number of changes compared to pre-pandemic times. Personally in the latter part of last year I was able to attend scientific meetings in person, for the first time since 2019.

There a number of conferences in the coming year either devoted to activities of our SIAG, or have a component related to it. In this edition of OP-SF Net there is an announcement of the conference “[Orthogonal Polynomials and Applications](#)” to be held in Leuven, Belgium in June. As part of the conference, the achievements of Walter Van Assche will be celebrated on the occasion of his 65th birthday. Walter has made many contributions both scientifically and to the SIAG, notably as my predecessor as chair of the SIAG.

Topic #2 ——— OP – SF Net 30.1 ——— January 15, 2023

From: Arno Kuijlaars (arno.kuijlaars@kuleuven.be)

Subject: Announcement: Conference on Orthogonal Polynomials and Applications, Leuven

Orthogonal Polynomials and Applications

Leuven, Belgium

June 8–10, 2023

<https://wis.kuleuven.be/events/conference-prof-walter-van-assche/orthogonal-polynomials-and-applications>

The aim of the conference is to bring together experienced researchers and younger scientists who are working in the area. The conference will be a forum to exchange ideas in order to advance the field of orthogonal polynomials.

Within the conference we also celebrate the achievements of Prof. [Walter Van Assche](#) on the occasion of his 65th birthday. Walter Van Assche is a leading figure in the field of orthogonal polynomials, special functions and their applications. He made fundamental contributions to orthogonal and multiple orthogonal polynomials, their algebraic and analytic properties as well as to their asymptotic analysis.

Registration will open around the end of January 2023.

Organizers are Tom Claeys (Louvain-la-Neuve), Arno Kuijlaars (Leuven) and Ana Loureiro (Kent).

Topic #3 ——— OP – SF Net 30.1 ——— January 15, 2023

From: Ahmad Barhoumi (barhoumi@umich.edu)

Subject: Report by **Barhoumi**: Special Session on OP at JMM 2023 in Boston, Massachusetts

Report on Special Session on Orthogonal Polynomials and their Applications at JMM 2023

The Special Session on [Orthogonal Polynomials and their Applications](#) took place at the most recent Joint Mathematics Meetings ([JMM 2023](#)). JMM 2023 was organized by the AMS in Boston, MA, and was held between January 4–7. The special session had three meetings which took place between January 6–7 and featured 21 speakers; each meeting included one or two invited, hour-long, lectures along with multiple invited and contributed 25-minute talks. The details of the hour-long lectures are as follows:

- Tom Trogdon, University of Washington, Seattle, Washington, USA, Perturbations of orthogonal polynomials: Riemann–Hilbert problems, random matrices and numerical linear algebra.
- Manuela Girotti, Saint Mary’s University, Halifax, Nova Scotia, Canada, Soliton versus the gas: Fredholm determinant, analysis and kinetic equations.
- Milivoje Lukic, Rice University, Houston, Texas, USA, An approach to universality using Weyl m -functions.
- Pavel M. Bleher, Indiana University–Purdue University Indianapolis (IUPUI), Indianapolis, Indiana, USA, Ensembles of random matrices with complex cubic and quartic potentials: phase diagram and topological expansion.

The session featured talks on a wide variety of topics, unified by orthogonal polynomials, and attracted attendance from the orthogonal polynomial community as well as other JMM attendees from different areas. The full schedule of the session with information on speakers, titles, and abstracts can be found on the AMS’s website [here](#). We are currently organizing a Contemporary Mathematics (CONM) Proceedings volume to go with our session. The volume is still in the early stages of planning, and more information on this will be available at a later date.

This special session was organized by:

Ahmad Barhoumi, University of Michigan, Ann Arbor, Michigan;

Roozbeh Gharakhloo, University of Michigan, Ann Arbor, Michigan; and

Andrei Martínez–Finkelshtein, Baylor University, Waco, Texas, and Universidad de Almería, Spain.

Topic #4 ——— OP – SF Net 30.1 ——— January 15, 2023

From: Gaurav Bhatnagar (bhatnagarg@gmail.com)

Subject: 2022 Annual Report by **Bhatnagar**: “Topics in Special Functions and Number Theory”

About the seminar

This is a report on the seminar on “Topics in Special Functions and Number Theory”, organized by Gaurav Bhatnagar (Ashoka University), Atul Dixit (IIT, Gandhinagar) and Krishnan Rajkumar (JNU). We meet approximately once every other week. The current timing is Thursdays, 4:00 – 5:00 PM (IST) though on occasion we deviate as per the speaker’s convenience. In case you wish to be informed of future talks, please drop a line to the organizers at sfandnt@gmail.com. The talks in the year 2022 (listed below) are all available on our website <https://www.sfnt.org>. We welcome suggestions

for talks.

Talk Announcement: Ramanujan Special 2023

The first talk of the year (on Feb 2, 2023) is a “Ramanujan Special”.

This year’s speaker is Shaun Cooper.

Title: Apéry-like sequences defined by four-term recurrence relations: theorems and conjectures

Speaker: Shaun Cooper (Massey University, Auckland, New Zealand)

When: Feb 2, 2023, 2:30 PM– 3:30 PM IST (Note special time; IST= GMT – 5:30)

Where: Zoom: Please write to sfandnt@gmail.com for the link

Talks in 2022

The following presented talks in the Seminar in 2022. All the talks are available on:

<https://www.sfnt.org>.

Ramanujan Special 2022. Alan Sokal (University College London and New York University): Coefficientwise Hankel-total positivity.

Mini Course. Kaneenika Sinha (IISER, Pune): Central Limit Theorems in number theory.

Seminar Talks. The following presented talks in the seminar in 2022.

1. Soumyarup Banerjee (IIT, Gandhinagar): Finiteness theorems with almost prime inputs.
2. Gaurav Bhatnagar (Ashoka University): An easy proof of Ramanujan’s famous mod 5 congruences.
3. Atul Dixit (IIT, Gandhinagar): Combinatorial identities associated with a bivariate generating function for overpartition pairs.
4. Neelam Kandhil (IMSc, Chennai): On an extension of a question of Baker.
5. Nishu Kumari (IISc, Bangalore): Factorization of Classical Characters twisted by Roots of Unity.
6. Amita Malik (Max Plank Institute, Bonn): Partitions into primes in arithmetic progressions.
7. Sunil L. Naik (IMSc, Chennai): Prime factors of non-zero Hecke eigen-values.
8. Krishnan Rajkumar (Jawaharlal Nehru University (JNU)): The Binet function and telescoping continued fractions.
9. Arindam Roy (UNC, Charlotte): On the Hyperbolicity of Jensen Polynomials for Power Partitions.
10. Nicholas A. Smoot (RISC at JKU, Austria): Partitions, Kernels, and Localization.
11. Surbhi Rai (IIT, Delhi): Expansion Formulas for Multiple Basic Hypergeometric Series Over Root Systems.
12. Murali K. Srinivasan (IIT Bombay): A q -analog of the adjacency matrix of the n -cube.
13. S. Ole Warnaar (University of Queensland, Australia): Cylindric partitions and Rogers–Ramanujan identities.
14. Wenguang Zhai (China Institute of Mining and Technology, Beijing, PRC): MC-algorithm and continued fraction formulas involving ratios of gamma functions.

From: Tom Koornwinder (thkmath@xs4all.nl)

Subject: Memorial Contribution for **Boele L. J. Braaksma** (1934–2023) by **Koornwinder**

Boele Braaksma, professor emeritus at the [University of Groningen](#) in the Netherlands, passed away on January 2, 2023. He was a classical analyst, using tools from complex analysis and asymptotics. He was a student of C. S. Meijer (of G -function fame). In the early years of his career he published on special functions and integral transforms. His later work focused on formal power series solutions of ordinary differential equations, in which he collaborated with French mathematicians. He remained mathematically active until the end of his life.

Braaksma's much cited paper [1] about the asymptotics of Fox's H -function is based on his Ph. D. Thesis. In papers with Meulenbeld they studied in [2] the Jacobi function transform and they gave in [3] an interpretation of Jacobi polynomials as spherical harmonics. This last paper gave rise to my first published paper [4], which was together with Aad Dijkma. Aad was then in Braaksma's group in Delft Technical University. In 1971 he moved with Boele to the University of Groningen.

Boele Braaksma was a coreferent (external examiner) at my Ph. D. Thesis defense at the University of Amsterdam in 1975. In Figure 10, he is posing his questions during the ceremony. In 2021 it was celebrated that he became professor at the University of Groningen 50 years ago. In Figure 11, you see Boele together with his former Ph. D. students who were present there.



Figure 1: Boele Braaksma in 1975.



Figure 2: Boele Braaksma on the 50th anniversary of his professorship with his former Ph. D. students. From left to right: Trudeke Immink, Jan Siersma, Henk Broer, Boele Braaksma, George Huitema, Bernard Faber, Tom Koornwinder, Robert Kuik.

1. B. L. J. Braaksma, Asymptotic expansions and analytic continuations for a class of Barnes-integrals, *Compositio Math.* 15 (1964), 239–341.
2. B. L. J. Braaksma and B. Meulenbeld, Integral transforms with generalized Legendre functions as kernels, *Compositio Math.* 18 (1967), 235–287.
3. B. L. J. Braaksma and B. Meulenbeld, Jacobi polynomials as spherical harmonics, *Indag. Math.* 30 (1968), 384–389.
4. A. Dijkstra and T. H. Koornwinder, Spherical harmonics and the product of two Jacobi polynomials, *Indag. Math.* 33 (1971), 191–196.

Topic #6 ——— OP – SF Net 30.1 ——— January 15, 2023

From: Paul Martin (pamartin@mines.edu)

Subject: Memorial Contribution for **Norman Bleistein** (1939–2022) by **Martin**

Many OPSF members will be familiar with the book by Bleistein and Handelsman, “Asymptotic Expansions of Integrals”, first published in 1975, with a second edition (with many corrections) in 1986. Bleistein’s early work (until about 1980) was on asymptotics of integrals, but then he became interested in inverse problems, especially those arising in the context of exploration geophysics where his expertise in short-wave asymptotics bore fruit. Norman Bleistein died in November 2022.

For a short obituary, go here:

<https://geophysics.mines.edu/project/dr-norman-bleistein-former-geophysics-professor-passes-away/>

From: OP–SF Net Editors

Subject: Eight Remembrances of **Richard B. Paris** (1946–2022)

Eight Remembrances of Richard Bruce Paris (January 23, 1946—July 8, 2022)

Below are eight remembrances of Richard Paris from his family and some of his colleagues:

**Jocelyne, Gaëlle & Simon Paris; Alastair Wood; Nico Temme; David Kaminski;
Mark Dunster; Atul Dixit; Vladimir Vinogradov; and Francesco Mainardi.**

* * *

Memorial of the late Dr. Richard Bruce Paris

Jocelyne, Gaëlle and Simon Paris (wife, daughter and son)

Born in Bradford on the 23rd January 1946, Richard started life in Yorkshire and subsequently in the Wirral, England. It is there, in early secondary schooling, that he developed a taste for Mathematics.

He entered the University of Manchester where he obtained a first class degree in Mechanical Engineering and later a Ph.D. in Mathematics. Richard secured his first post-doctoral job with Euratom in Fontenay-aux-Roses in 1974 and moved to France. A transfer to Cadarache and therefore a further move to the South of France was in 1984. Richard also spent time collaborating and researching fusion in Los Alamos, U.S.A. in the 1980s.

The family moved to Scotland and Richard began employment as a senior lecturer at the University of Abertay, Dundee in late 1987 and obtained a Honorary readership at the University of St. Andrews in 1988. Richard further obtained a Doctor of Science at the University of Manchester in 1999 and retired in 2010 but continued with research. Richard was bilingual in English and French and was self-taught in several others. Richard was always keen to learn and a skilled craftsman. Richard also painted and played the guitar in his younger days. Richard's passion was nonetheless no other than Mathematics and he continued to write and publish until the very end.

With great sadness, Dr. Richard Bruce Paris, passed away surrounded by his family but peacefully on Friday, the 8th of July, 2022. Richard was a caring husband and father and is sorrowfully missed.

* * *

For a link to a tribute by his niece **Sylvie Neidinger** to Richard Paris, see:

<https://duboutduborddulac.blog.tdg.ch/archive/2022/07/08/hommage-au-mathematicien-richard-bruce-paris-323354.html>.



Figure 3: Richard Paris at a thermal water park in Contrexeville, France 2003, near the birthplace of his wife, Jocelyne Neidinger, who took the photo.

R. B. Paris 1946–2022

Alastair Wood, Emeritus Professor, Mathematics
Dublin City University, Dublin, Ireland

There is no doubt that Richard will be most celebrated for his contributions to Special Functions, both for the two chapters which he wrote in DLMF and as an Associate Editor but also from his steady stream of papers in the area which are already covered in this memorial edition by many experts in the field. This article will describe his less known early researches and give some personal reminiscences of Richard's background, education and methods of working.

Richard's father was an engineer in Bradford, Yorkshire, whose work took him to the other side of the Pennines to the Wirral Peninsula in Cheshire, where the family settled in the mid-1950s. Richard attended Calday Grange Grammar School in West Kirkby where a young and enthusiastic teacher imbued him with a lifelong passion for mathematics. His father encouraged Richard to pursue a career in Engineering and he emerged with a 1st class honours degree in Mechanical Engineering

from Manchester University in 1967. At this stage Richard realised that his true vocation was mathematics and he switched to the Department of Mathematics for his postgraduate studies. It was thus that Richard and I arrived in the Department in the same month, September 1967, he to research into magnetic braking of stars with Leon Mestel and myself in my first lecturing post in pure mathematics.



Figure 4: Richard Paris in the Calday Grange school photograph 1954.

Manchester at that time was one of the leading departments in Britain, large numbers of well-qualified students and distinguished senior professors. The departmental chairman in 1967 was Fields Medallist, Frank Adams, and the applied staff were equally impressive. The fluid dynamacist James Lighthill had recently left and among the other professors was Fritz Ursell, a name not unknown in asymptotic analysis. The departmental interests also included mathematical logic and computer science, where a previous lecturer had been Alan Turing. Thus it was a very exciting environment for both of us. Richard and I did not meet until 1969 when he was assigned to me as a tutorial assistant for my final year Mathematical Methods course, which included asymptotics of integrals and Stokes phenomenon. Little did we realise that within 10 years we would be writing research papers together on these subjects.

But this did not happen at once. Richard obtained his Ph.D. in 1971 and I had moved to lecture in Cranfield Institute of Technology, the former College of Aeronautics in Bedfordshire. I was looking at a new set of problems and had forgotten about Richard, when I noticed that someone from the French atomic energy authority CEA had published results on a fourth order differential equation in 1974 in *Phil. Trans Royal Society A* which were very similar to those I had reported in the *Journal of the London Mathematical Society* in 1971. Given his French sounding name and affiliation, I dashed off a letter to point this out. I received a very speedy and reasonable reply which ended "By the way, I think we know each other from Manchester". This was typical of his personal and professional integrity. Having lost touch, I had not realised that Richard had obtained his first job in the Department of Controlled Fusion of the CEA in Fontenay-aux-Roses in the suburbs of the city

of Paris. Needless to say we exchanged visits and quickly realised that by pooling our methods we could tackle a much wider class of equations and in 1979 the first of a series of papers appeared in the same *Phil. Trans. Journal*. This was the start of a collaboration which produced 19 papers over the next 18 years. We even published one in French in *Comptes Rendues Acad. Sc. Paris* in 1981. At that time the Pitman Advanced Publishing Program was getting under way and we were invited to submit a research monograph which appeared as *Asymptotics of high order differential equations*, Longmans, London, 1986. Starting from different ends of the mathematical sciences spectrum, functional analysis and astrophysics, we had converged on asymptotic analysis which would be a lasting interest for both of us.

While with CEA–Euratom, Richard worked in the Section of Ionised Gases in the Department of Plasma Physics and Controlled Fusion in Fontenay–aux–Roses, applying techniques he had learned in astrophysics to thermonuclear research. Considerable effort was going into understanding the tearing mode in toroidal geometry because one of the earliest tokamak machines, which I saw on my first visit to him in 1980, had been installed at Fontenay. But by that time most of the larger machines had been moved further out from Paris to a new Centre for Nuclear Studies at Saclay. He published on coupling of electromagnetic waves and plasma waves in inhomogeneous finite temperature plasma and later on stationary convective–like modes in a plasma slab with magnetic shear. He also had links with the Observatory of Paris at nearby Meudon, where he gave a series of lectures on resistive instabilities in MHD to the workshop on stellar atmospheres. He made research visits to Los Alamos for research discussions with fusion workers in the USA in 1979, 1981 and 1983.

While living in France, Richard met and married Jocelyne Neidinger, a midwife from the Vosges region in eastern France; they had two children, Gaëlle and Simon. They lived in an old two–storey house with a large garden in the picturesque village of La Celle Les Bordes in the Forest of Rambouillet, a tranquil location, but still within easy reach of Paris. Richard liked to work in peace at home whenever he could and only went into the office whenever it was necessary. Much of our Pitman book was written in the orchard behind the house. When not doing mathematics (a rare event), Richard enjoyed gardening, whizzing round on his lawn tractor, also maintenance of his property, drawing on his mechanical engineering skills. During the 3 month sponsored visit in 1980 we were able to rent a stone cottage from an absent neighbour in the same village and my family came over for a month – halcyon days! Further visits and reciprocals took place in 1984.

But this idyll could not last. As the name suggests, CEA–Euratom was an association of the French government Commissariat à l’Energie Atomique and the European Commission Fusion Committee, reporting to both bodies. A political decision was taken to move all the theorists in the Department of Controlled Fusion closer to the experimental work going on at the large nuclear centre at Cadarache in Provence on the banks of the river Durance which provided cooling water for the nuclear reactors in case of need. This move from the Paris region to deepest rural France was not popular and posed all sorts of problems for staff, their spouses and children. As a European scientific civil servant Richard had little choice and 1984 found the Paris family installed in a flat in the small town of Manosque. To make matters worse, the central administration was starting to direct research towards problems arising from the needs of the experimentalists. Richard had developed a wider range of interests and started applying for jobs at senior lecturer level in British universities. Despite his outstanding publication record, departments seemed unwilling to take a risk on an applicant who lacked any undergraduate teaching experience, but eventually Richard received two offers, one being the University of Abertay, Dundee in Scotland where the family arrived in December 1987. The move worked out well for all parties. Richard was an excellent teacher, popular with students. The children found a very good secondary school, Harris Academy, near to home. Research assessment exercises had now been introduced in Britain, and the Department of Mathematics and Computing had a welcome boost in their rating. In a small department Richard had no one else in his areas of research, but in 1988 he obtained an honorary readership in the nearby University of St. Andrews where he knew research colleagues.



Figure 5: Richard Paris with Alastair Wood at the unveiling of the memorial to G. G. Stokes at Skreen.

But our cooperation was not quite finished. We were both interested in the rise of Exponential Asymptotics, which had their origins in the 1850 and 1857 papers by our shared hero G.G. Stokes, and attended parts of the 6 month Workshop held in the first half of 1995 at the Isaac Newton Institute, Cambridge. There we met Michael Berry, which led to the four Stokes Summer Schools held at Stokes's birthplace in Skreen, County Sligo (I had moved to Dublin City University in 1982) and with Frank Olver who raised the question of writing chapters for the new DLMF project. Although we produced a joint paper on Exponentially-improved asymptotics for the gamma function in 1992 and our last paper On the resistive interchange mode in the presence of equilibrium flow in 1996, our research interests were diverging as more and more of Richard's time was taken up by the Project. The last time I saw Richard was when I came to Dundee as Ph.D external examiner for one of his students in the late 1990s. We remained in regular contact as friends, however, even after my retirement in 2003 to work on a biography of Stokes. This volume finally appeared in 2019, just in time for the bicentenary of his birth, as a collection of essays by prominent workers in the fields covered by Stokes, Richard writing the chapter on Stokes's Mathematical work (*George Gabriel Stokes: Life, Science and Faith*, eds. Mark McCarthy, Andrew Whitaker, Alastair Wood: Oxford University Press, 2019).

This was to be our last professional contact. As usual Richard sent me an email on my birthday in June 2022. I replied suggesting that we might write a quasi-historical account of Stokes's 1889

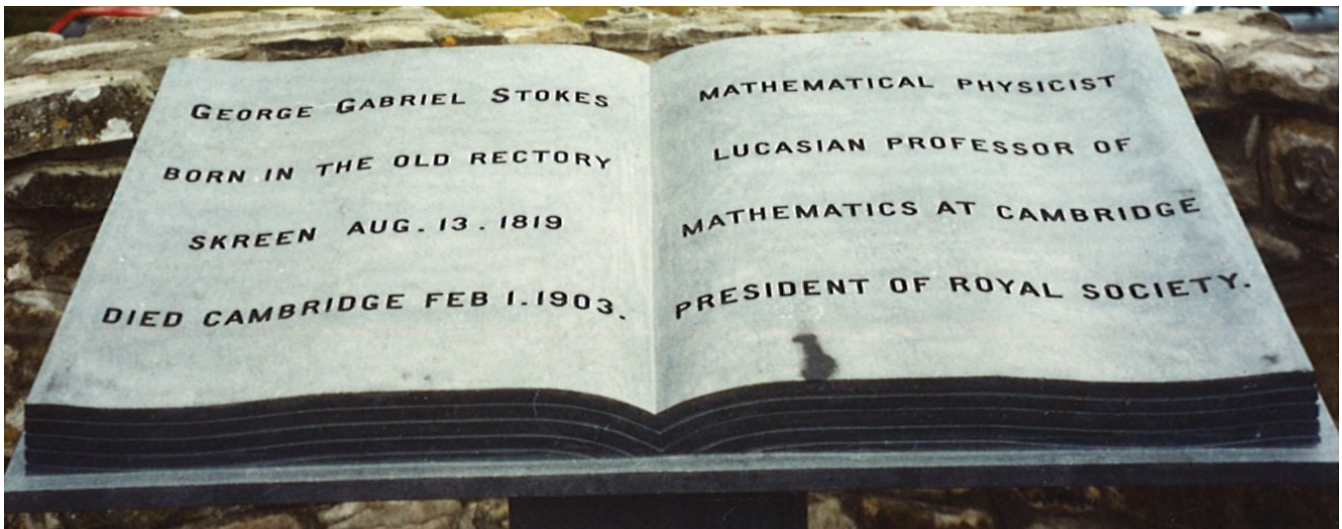


Figure 6: The wording on the Skreen memorial to G. G. Stokes.

paper on approximating functions defined by convergent series, his first mathematical paper since his seminal work on integrals in the 1850's. Richard replied on 30th June with various comments and suggestions on the proposal but regretting that he could not cooperate because of a major illness. Never one to make a fuss, he explained he had been in hospital for 3 weeks with a collapsed lung and had been sent home on oxygen. This did not sound good, and on 8th July his daughter Gaëlle contacted me to say that my friend and collaborator over fifty years had passed away quietly in the early hours of that morning, surrounded by his family. Within a week of his death he was still thinking about mathematics. May he rest in peace.

Alastair Wood is Emeritus Professor of Mathematics in Dublin City University and lives permanently in the French Pyrenees. He wishes to thank Gaëlle Paris for her assistance in writing this tribute to her father.

In Memoriam Richard Paris

Nico Temme, Researcher emeritus, Centrum Wiskunde & Informatica (CWI).

I read the sad message about Richard's passing in a blog of his niece Sylvie. Last fall, Francesco Mainardi wrote that Richard was ill, but I didn't take any action on this. The message in the blog hit me hard, also because if you look at Richard's activities over the last few years, you can safely conclude that he died in a very productive period of his retirement. I will miss Richard very much, a fine friend, a dedicated, inspired and passionate colleague, and a source of information about the asymptotic problems we studied.

Given the many co-authors, Richard also often responded to questions from others and thus often became involved in joint publications. This often concerned integrals or problems related to special functions, such as the Riemann zeta function, the incomplete gamma functions, generalized hypergeometric functions, but also quadratic Gauss series, Mellin-Barnes integrals, Hadamard developments, and so on. And all this with the usual mathematical precision for him. Often when I read the introduction of an article I thought how to go about something like this, but Richard successfully got the job done.



Figure 7: CWI, Amsterdam 1993. left-to-right: Frank Olver, Gré Temme, Nico Temme, Richard Paris. Collection CWI.

My own experience was also that he always responded immediately to questions asked. Ten years ago, when I mentioned casually that I was finishing a book, he immediately suggested getting a draft version. He gave me all sorts of advice about math and of course English.

In writing the DLMF Chapter 8 on the incomplete gamma functions, Richard had seen a reference to a 1942 thesis (in Dutch, with German summary) by H. P. Dopper, “Asymptotische Ontwikkelingen van de Onvolledige Gammafuncties”, supervised by Prof. Dr. J. G. van der Corput. Although I had the book on my bookshelf at home, I had never taken it seriously. Richard asked if I knew it and if so, if he could have it sent to him. I did this, but it never occurred to me to include a Dutch-English dictionary. Gradually he asked about all kinds of Dutch words, and I expected him to refer to the thesis in the DLMF, but he didn’t, even though the thesis contains interesting results in retrospect.

Richard was an invited speaker at a symposium to mark my 25th anniversary of CWI in 1993. The title of his lecture was “Smoothing of the Stokes Phenomenon: Application to the Gamma and Zeta Functions”. In 1989, Michael Berry had given an innovative explanation for the Stokes phenomenon. A day before the symposium, Adri Olde Daalhuis obtained his Ph.D. at the University of Amsterdam. Frank Olver was a member of the committee and his lecture at the symposium was entitled “Exponentially Improved Asymptotic Solutions of Ordinary Differential Equations”. Richard and Frank were involved in heated discussions about these subjects. An attached photo was taken during the symposium. Richard was also an invited speaker for a conference in Santander (Spain) on the occasion of my retirement in 2005. I have also attached a few photos of this meeting.

In recent years we hardly saw Richard at foreign conferences. I remember a meeting in Hong Kong in 2004, where he and many colleagues were invited as principal speakers. Beforehand, Richard grumbled in an email to me that because of the large number of principal speakers, with three parallel sessions, we were only allocated twenty minutes of speaking time. He went, but he thought it was a waste of time and travel money for those twenty minutes of speaking time. I am enclosing photos from the visit to Hong Kong (David Kaminski Collection).

Richard is no longer with us, the large parameter tends to eternity.



Figure 8: Santander, Spain 2005. Left figure: left-to-right: David Kaminski, Richard Paris, Francesco Mainardi. Collection Alfredo Deaño Cabrera. Right figure: left-to-right: Dmitrii Karp, Richard Paris, Gré Temme, Nico Temme, Adri Olde Daalhuis. Collection David Kaminski.



Figure 9: Hong Kong 2004. Left figure: left-to-right: Richard Paris, Frank Olver, Mark Dunster; Right figure: Richard and Jocelyne Paris. Collection David Kaminski.

Recollections of Richard Paris

David Kaminski, Professor Emeritus, Department of Mathematics & Computer Science,
University of Lethbridge, Lethbridge, Alberta, Canada.

I had been working on crafting a biography of Richard, but in light of the other excellent accounts provided elsewhere in this newsletter, I elected instead to share a few of my memories of time spent with Richard.

I first met Richard at a conference in Winnipeg organised by Rod Wong to celebrate Frank Olver's 65th birthday—at the time, Richard's affiliation was with the Dundee Institute of Technology, prior to its change in status to a university. A couple of years after that meeting, Wong organised a small workshop on the campus of the University of Manitoba and from that second encounter, I screwed

up the courage to ask Richard to play host for me in my first sabbatical. It was my good fortune that he agreed, and so it happened that I dragged my young family with me to Dundee in the summer of 1995 for a year of work with him.

Richard found me a cubbyhole of an office in an attic at the now Abertay University, which was something of a blessing as he had to share an office at the time. We had almost daily meetings discussing some of the problems I had hoped to investigate, but which were stubbornly proving to lead nowhere. After abandoning those efforts, our attention turned to the asymptotics of Laplace-type integrals with polynomial phases which we could render as iterated Mellin-Barnes integrals. Some initial successes with a few special cases blossomed into a very productive year indeed. A particularly delightful working memory resulted from the day Richard brought into the office an old Meccano set from his childhood days and some string which we used to make physical models of the faces of Newton polygons for the phases of our multidimensional integrals.

During that time, my family was staying in student accommodation at the university in the west end of Dundee. Richard and Jocelyne would occasionally host dinner parties for us (me, my wife and two young daughters) at their magnificent house in Broughty Ferry, giving us a respite from our more austere lodgings.

Following that year of joint work, Richard and Jocelyne paid a visit to us in Lethbridge which ultimately bore fruit as our paper on the Pearcey integral, and exposed both of them to searingly hot summer weather: the day they arrived in Lethbridge from their drive from Calgary airport it was a 35 C day, and the campus accommodation I had arranged for them had no air conditioning. The heat wave persisted for days. There would prove to be no subsequent summer visit in the years that followed.

Richard played host again for another sabbatical visit from me (sans family) in 2002, and by this time our book was complete. This next round of work focused on what would become our contribution to exponential asymptotics, which Richard subsequently elaborated into his solo, and final monograph. This time, Richard was able to share his office with me, sparing me isolation in an attic at the university. We didn't get to play with childhood toys in this iteration, but I was a regular weekend visitor to Richard and Jocelyne's home on weekends, occasionally helping Richard with some gardening around their place. We regularly marked the end of our working week at a nearby pub with Friday lunches decorated with a small beer.

My wife and I did visit Richard and Jocelyne a few other times, one of which coincided with his hospital stay for heart surgery, from which happily he mended well. Of course, I did get to see Richard from time to time at conferences, but those encounters became less frequent as the years went by. We did see them after his retirement for a purely social visit, and spent the day walking together on the Broughty Ferry beach and dining later at their house. Sadly, it was the last time we would meet face to face.

Richard was an exceptional mathematician and a friend to me, and we are all the poorer for losing him.

* * *

Memorial contribution for Richard Paris

T. Mark Dunster, Professor, Department of Mathematics & Statistics,
San Diego State University, San Diego, California.

I was very sad to hear about the passing of Richard Paris. Richard was a first class mathematician with extraordinary output, particularly after retirement, with more than 160 papers, numerous co-authors, and a number of books. In recent years almost every issue of the OPSF-Net Newsletter

seemed to have at least one new preprint listed with Richard's name on it.

Richard started his career with higher order differential equations but transitioned to focusing on the asymptotic behaviour of integrals. Richard's methods were very thorough and his attention to detail was top quality. He spent several years investigating the asymptotics of the Riemann zeta function, and we shared several discussions on this very beautiful, but complicated and challenging function.

A few decades ago, during my short visit to Dundee, Richard and his wife Jocelyne were very kind hosts. At that time we initiated work on a joint paper, and it was then that I became fully aware of his attention to detail. His papers were very rigorous and he never neglected numerical computations to verify the accuracy of his results, often utilising his mastery of Mathematica. Richard was dedicated to his research, but always found time to review other people's work. Over the years we remained in contact, most recently in discussions about Lommel functions, which are found in a [chapter he wrote for the DLMF](#). The area of asymptotic analysis and special functions has lost a leading expert.

Mark Dunster, Professor, San Diego State University, San Diego, California



Figure 10: Richard Paris.

Memorial Contribution for Richard Paris

Atul Dixit, Associated Professor, Discipline of Mathematics,
Indian Institute of Technology Gandhinagar, Palaj, Gandhinagar Gujarat, India.

Richard Bruce Paris was an excellent mathematician and one of the world authorities on special functions and their asymptotics. He impacted my work and my research interests both directly and indirectly. My first contact with him was through his book (with D. Kaminski) titled 'Asymptotics and Mellin–Barnes Integrals'. It is an excellent book for students and professors alike, containing many useful techniques associated with asymptotics and dealt with by means of the Mellin–Barnes integrals.

My first direct contact with him was when he wrote to me to check whether his Zentralblatt Math review of one of my papers looked okay to me, and after which he would submit it. I had just joined IIT Gandhinagar as an Assistant Professor then. His conscientiousness left a deep impression on my mind. Our next correspondence was when I had asked him a question regarding asymptotics of a new generalization of the Hurwitz zeta function that my student and I had found. My last email to him was on December 8, 2022 asking him if he knew of any generalizations of Parseval's formula for Mellin transforms. This email bounced back twice even though I had entered the correct address. This was inexplicable. Four days later, Professor Nico M. Temme wrote an email saying Professor Paris passed away on July 8, 2022! I was shocked and saddened to learn this. This also explained why my emails were bouncing.

Sadly I never got a chance to meet him personally. He was a prolific researcher with more than 150 publications covering diverse topics related to special functions and their applications with an emphasis on the involved asymptotics. More than that, he was a nice human being, always ready to help anyone. He will be dearly missed by all of us.

My joint work with Richard B. Paris in analytical Probability Theory

Vladimir Vinogradov, Professor, Department of Mathematics,
Ohio University, Athens, Ohio.

Beginning in the summer of 2011, I introduced Richard to numerous subtle problems of analytical Probability Theory and the Theory of Stochastic Processes. His previous exposure to Probability was rather limited although he taught it before at Abertay University, but on a rather elementary level. Richard retired from teaching at about the same time, and he was eager to learn something new and share his expertise in special functions and analytical methods.

Our first joint paper (written in collaboration with Olga Yanushkevichiene from Vilnius) was quite long. It dealt with subtle properties of members of the power–variance family of probability distributions which are also known as Tweedie models. In addition, in the same paper we introduced V. M. Zolotarev polynomials. In order to derive new results of Probability Theory, Richard had to prove some theorems on the “reduced” Wright function, which were previously unknown.

My subsequent work with Richard pertained to a completely different set of problems related to the fluctuation properties of various Lévy stochastic processes. Again, his superb analytical skills and expertise in special functions helped discover a solution to the problem which was posed by Sir David Cox back in 1962.

We then continued our collaboration by tackling such diverse problems as studying asymptotics for some important classes of birth–and–death–type stochastic processes with both discrete and continuous time as well as for various classes of discrete and absolutely continuous probability distributions. I presented our latest joint paper on two extensions of the canonical Feller–Spitzer distribution at the Fields Institute in April of 2022.

I should say that we also published a joint paper in Analysis concerning asymptotic and structural properties of special cases of the Wright function, and that some problems of Probability Theory

which I introduced Richard to led to at least two of his solo publications in Analysis.

I visited Richard in Dundee in the Fall of 2014 and planned to come there again during my forthcoming sabbatical. He will be greatly missed.

Below are a few relevant links (in the reverse chronological order):

<https://video-archive.fields.utoronto.ca/view/12139>

<https://jsdajournal.springeropen.com/counter/pdf/10.1186/s40488-021-00113-4.pdf>

<https://arxiv.org/pdf/2008.04797.pdf>

<https://link.springer.com/article/10.1007/s10986-020-09488-4>

<https://jsdajournal.springeropen.com/counter/pdf/10.1186/s40488-017-0068-1.pdf>

<https://link.springer.com/article/10.1007/s10986-016-9324-1>

<https://video-archive.fields.utoronto.ca/view/4205>

<https://digitalcommons.lsu.edu/cgi/viewcontent.cgi?article=1353&context=cosa>

<https://digitalcommons.lsu.edu/cgi/viewcontent.cgi?article=1290&context=cosa>

<https://link.springer.com/article/10.1007/s10986-014-9240-1>

<https://link.springer.com/article/10.1007/s10986-013-9197-5>

<https://link.springer.com/article/10.1007/s10986-012-9186-0>

Vladimir V. Vinogradov, Professor of Mathematics, Ohio University

Visiting Professor, University of Toronto

Visiting Member, The Fields Institute

Visiting Professor, York University

<https://www.utsc.utoronto.ca/cms/vladimir-vinogradov>

<https://www.statistics.utoronto.ca/people/directories/all-faculty/vladimir-vinogradov>

Memorial of the late Professor Richard Paris

Francesco Mainardi, Professor, Department of Physics,
University of Bologna, Bologna, Italy.

Richard Paris, Retired Professor of Applied Mathematics, Abertay University, Dundee, Scotland, United Kingdom, passed away on July 8, 2022.

He was well known in the community of special functions for his books and in particular for two chapters in the [NIST Digital Library of Mathematical Functions](#) (NIST Handbook of Mathematical Functions).

I take the liberty to edit some notes for his memorial because, incidentally, I was presumably the last co-author of two recent published papers. Furthermore he passed away while we are working on a third perspective paper.

It was in the first years of 2000's that I contacted him about his nice and interesting book on Mellin-Barnes integrals. Furthermore of asking some papers by him, I informed that originally (due to a sentence of Tricomi in the Bateman Handbook) the idea of similar integrals was due to the Italian mathematician Salvatore Pincherle, but published in Italian (see the paper by F. Mainardi and G. Pagnini (2003), [http://dx.doi.org/10.1016/S0377-0427\(02\)00609-X](http://dx.doi.org/10.1016/S0377-0427(02)00609-X)).

We started a nice and interesting correspondence that was reinforced after our meeting in Santander, Spain, on the occasion of the retirement of Professor Nico Temme at his 65th birthday, in July 2005, see <https://historicosweb.unican.es/sf05/>.

Prof. Paris was invited from my colleagues Yuri Luchko and Anatoly Kochubei to publish a chapter on asymptotics of special functions relevant in Fractional Calculus in the handbook edited by the

late Prof. Tenreiro Machado, <https://doi.org/10.1515/9783110571622-012>.

His papers on asymptotic theory were fundamental for my paper (co-authored with R. Garrappa and S. Rogosin) concerning a generalization of the Le Roy special function, <https://doi.org/10.1515/fca-2017-0063>.

More recently, I had the opportunity to be aware of his skill on special functions of the Wright type that are fundamental in Fractional Calculus in two papers of ours co-authored with my former student A. Consiglio published in *Fractional Calculus and Applied Analysis* (FCAA), see

1. <https://doi.org/10.1515/fca-2021-0003>
2. <https://doi.org/10.1007/s13540-022-00042-2>

Furthermore, I convinced him to submit and publish 3 papers, one in FCAA, <https://doi.org/10.1007/s13540-022-00031-5>, and two in the journal *Mathematics* (MDPI), in special issues where I was a Guest Editor.

1. <https://doi.org/10.3390/math8030428>
2. <https://doi.org/10.3390/math9121454>

Because I recognized in him a great expert of asymptotic expansions, I invited him to revise and generalize an old paper by F. Tricomi (published in Italian and provided to him by myself), see <https://arxiv.org/abs/2201.02399>.

In recent times Prof. Paris was able to submit any month a research paper to arXiv. He told me that this was allowed only one per month. This means that he remained so active up to the end of his life, a rare example for retired professors. The readers of arXiv can verify this surprising activity. Referring to the year 2022, in decreasing order since June to January: [2206.09383](https://arxiv.org/abs/2206.09383), [2205.03161](https://arxiv.org/abs/2205.03161), [2204.09306](https://arxiv.org/abs/2204.09306), [2203.07863](https://arxiv.org/abs/2203.07863), [2202.02049](https://arxiv.org/abs/2202.02049), [2201.02399](https://arxiv.org/abs/2201.02399) (on Tricomi's paper).

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PROFILE: <http://scholar.google.com/scholar?hl=en&lr=&q=f+mainardi>

Topic #8 ——— OP – SF Net 30.1 ——— January 15, 2023

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 November and December 2022. This list has been separated into two categories.

OP-SF Net Subscriber E-Prints

<http://arxiv.org/abs/2211.00092>

Universal minima of discrete potentials for sharp spherical codes
Peter Boyvalenkov, Peter Dragnev, Douglas Hardin, Edward Saff, Maya Stoyanova

<http://arxiv.org/abs/2211.00327>

Recurrence relations and general solution of the exceptional Hermite equation
Alfred Michel Grundland, Danilo Latini, Ian Marquette

<http://arxiv.org/abs/2211.00760>

Hyponormal Toeplitz Operators on the Bergman Space of the Disk
Nicole Revilla, Brian Simanek

<http://arxiv.org/abs/2211.01035>

Nonlinear oscillators via Čebyšëv quintic approximations
Martina Boschi, Daniele Ritelli, Giulia Spaletta

<http://arxiv.org/abs/2211.01558>

Gap Labels for Zeros of the Partition Function of the 1D Ising Model via the Schwartzman Homomorphism
David Damanik, Mark Embree, Jake Fillman

<http://arxiv.org/abs/2211.02550>

Counting Permutations Where The Difference Between Entries Located r Places Apart Can never be s (For any given positive integers r and s)
George Spahn, Doron Zeilberger

<http://arxiv.org/abs/2211.03259>

Quadratic Crofton and sets that see themselves as little as possible
Stefan Steinerberger

<http://arxiv.org/abs/2211.03435>

Upper bounds and asymptotic expansion for Macdonald's function and the summability of the Kontorovich–Lebedev integrals
S. Yakubovich

<http://arxiv.org/abs/2211.04375>

Explicit Forms and Proofs of Zagier's Rank Three Examples for Nahm's Problem
Liuquan Wang

<http://arxiv.org/abs/2211.04778>

An improvement of sufficient condition for k -leaf-connected graphs
Tingyan Ma, Guoyan Ao, Ruifang Liu, Ligong Wang, Yang Hu

<http://arxiv.org/abs/2211.04858>

Multiple orthogonal polynomials associated with the exponential integral
Walter Van Assche, Thomas Wolfs

<http://arxiv.org/abs/2211.06999>

Orthogonal polynomials on a class of planar algebraic curves
Marco Fasoldini, Sheehan Olver, Yuan Xu

<http://arxiv.org/abs/2211.07053>

Non-standard Green energy problems in the complex plane
Abey López-García, Alexander Tovbis

<http://arxiv.org/abs/2211.08175>

The Orbit-Sum Method for Higher Order Equations
Manfred Buchacher, Manuel Kauers

<http://arxiv.org/abs/2211.08763>

A modular relation involving a generalized digamma function and asymptotics of some integrals containing $\Xi(t)$

Atul Dixit, Rahul Kumar

<http://arxiv.org/abs/2211.08933>

Partitions with constrained ranks and lattice paths

Sylvie Corteel, Sergi Elizalde, Carla Savage

<http://arxiv.org/abs/2211.09094>

Guessing cards with complete feedback

Andrea Ottolini, Stefan Steinerberger

<http://arxiv.org/abs/2211.10599>

Eigenvalue Analysis and Applications of the Legendre Dual–Petrov–Galerkin Methods for Initial Value Problems

Desong Kong, Jie Shen, Li–Lian Wang, Shuhuang Xiang

<http://arxiv.org/abs/2211.10704>

Recovering the orthogonal polynomials from their specific spectral transformations

Vikash Kumar, A. Swaminathan

<http://arxiv.org/abs/2211.12658>

Asymptotics of Discrete q –Freud II orthogonal polynomials from the q –Riemann Hilbert Problem

Nalini Joshi, Tomas Lasic Latimer

<http://arxiv.org/abs/2211.13645>

Generalised higher–order Freud weights

Peter A. Clarkson, Kerstin Jordaan, Ana Loureiro

<http://arxiv.org/abs/2211.14482>

The gerrymander sequence, or A348456

Anthony J. Guttmann, Iwan Jensen

<http://arxiv.org/abs/2211.14704>

Quantum State Transfer in Graphs with Tails

Pierre–Antoine Bernard, Christino Tamon, Luc Vinet, Weichen Xie

<http://arxiv.org/abs/2211.14717>

Derivation of Identities of the Rogers–Ramanujan Type by the Method of Constant Terms

Andrew V. Sills

<http://arxiv.org/abs/2211.15240>

p –Linear schemes for sequences modulo p^r

Frits Beukers

<http://arxiv.org/abs/2212.00525>

The complex elliptic Ginibre ensemble at weak non–Hermiticity: bulk spacing distributions

Thomas Bothner, Alex Little

<http://arxiv.org/abs/2212.02118>

Recurrences for certain sequences of binomial sums in terms of (generalized) Fibonacci and Lucas polynomials

Johann Cigler

<http://arxiv.org/abs/2212.02260>

Complementary Romanovski–Routh polynomials and their zeros
Luana L. Silva Ribeiro, Alagacone Sri Ranga, Yen Chi Lun

<http://arxiv.org/abs/2212.02355>

A new (but very nearly old) proof of the Rogers–Ramanujan identities
Hjalmar Rosengren

<http://arxiv.org/abs/2212.03108>

Two–body Coulomb problem and $g^{(2)}$ algebra (once again about the Hydrogen atom)
Alexander V. Turbiner, Adrian M. Escobar Ruiz

<http://arxiv.org/abs/2212.05041>

QBD processes associated with Jacobi–Koorwinder bivariate polynomials and urn models
Lidia Fernández, Manuel D. de la Iglesia

<http://arxiv.org/abs/2212.05252>

Some identities related to degenerate r –Bell and degenerate Fubini polynomials
Taekyun Kim, Dae San Kim, Jongkyum Kwon

<http://arxiv.org/abs/2212.05694>

Correct and Alternative Numerical Algorithms for the Complete Elliptic Integral of the First Kind in MATLAB and Mathematica
Hong–Yan Zhang, Yu Zhou, Yu–Tao Li, Fu–Yun Li, Yong–Hui Jiang

<http://arxiv.org/abs/2212.05968>

Beyond Shapiro’s problem: from cyclic sums to “graphic” sums
Sergey Sadov

<http://arxiv.org/abs/2212.06414>

Even Order Explicit Symplectic Geometric Algorithms for Quaternion Kinematical Differential Equation in Guidance Navigation and Control via Diagonal Padè Approximation and Cayley Transform
Hong–Yan Zhang, Fei Liu, Yu Zhou, Man Liang

<http://arxiv.org/abs/2212.06526>

Planar Orthogonal Polynomials As Type I Multiple Orthogonal Polynomials
Sergey Berezin, Arno B. J. Kuijlaars, Iván Parra

<http://arxiv.org/abs/2212.06831>

On Almost Orthogonal Series
Ruiming Zhang

<http://arxiv.org/abs/2212.06935>

The partition function modulo 4
Ken Ono

<http://arxiv.org/abs/2212.07232>

Classical continued fractions for some multivariate polynomials generalizing the Genocchi and median Genocchi numbers
Bishal Deb, Alan D. Sokal

<http://arxiv.org/abs/2212.07590>

Rearrangement Inequalities on the Lattice Graph
Shubham Gupta, Stefan Steinerberger

<http://arxiv.org/abs/2212.09336>

Landen transformations applied to approximation
Rahim Kargar, Oona Rainio, Matti Vuorinen

<http://arxiv.org/abs/2212.09805>

Computation of entanglement entropy in inhomogeneous free fermions chains by algebraic Bethe ansatz
Pierre–Antoine Bernard, Gauvain Carcone, Nicolas Crampe, Luc Vinet

<http://arxiv.org/abs/2212.10116>

On the representability of sequences as constant terms
Alin Bostan, Armin Straub, Sergey Yurkevich

<http://arxiv.org/abs/2212.10235>

Spectral theory for bounded banded matrices with positive bidiagonal factorization and mixed multiple orthogonal polynomials
Amílcar Branquinho, Ana Foulquié–Moreno, Manuel Mañas

<http://arxiv.org/abs/2212.10824>

Bivariate P -polynomial association schemes
P.–A. Bernard, N. Crampe, L. Poulain d’Andecy, L. Vinet, M. Zaimi

<http://arxiv.org/abs/2212.11229>

Karlin–McGregor polynomials, Geronimus polynomials and Haar measures of hypergroups
Stefan Kahler, Ryszard Szwarc

<http://arxiv.org/abs/2212.11513>

On symmetric solutions of the fourth q -Painlevé equation
Nalini Joshi, Pieter Roffelsen

<http://arxiv.org/abs/2212.11923>

Hahn multiple orthogonal polynomials of type I: Hypergeometrical expressions
Amílcar Branquinho, Juan E. F. Díaz, Ana Foulquié–Moreno, Manuel Mañas

<http://arxiv.org/abs/2212.11949>

On a new class of 2-orthogonal polynomials, II: The integral representations
Khalifa Douak, Pascal Maroni

<http://arxiv.org/abs/2212.13236>

A general formula for Hecke-type false theta functions
Eric T. Mortenson

<http://arxiv.org/abs/2212.14544>

Real roots of random orthogonal polynomials with exponential weights
Yen Do, Doron Lubinsky, Hoi H. Nguyen, Oanh Nguyen, Igor Pritsker

<http://arxiv.org/abs/2212.14841>

Identities for combinatorial sums involving trigonometric functions
Horst Alzer, Semyon Yakubovich

<http://arxiv.org/abs/2212.14850>

Some identities on generalized harmonic numbers and generalized harmonic functions

Dae san Kim, Hye Kyung Kim, Taekyun Kim

Other Relevant OP–SF E–Prints

<http://arxiv.org/abs/2211.00265>

Interpolated polynomial multiple zeta values of fixed weight, depth, and height

Minoru Hirose, Hideki Murahara, Shingo Saito

<http://arxiv.org/abs/2211.00304>

Crossing the transcendental divide: from translation surfaces to algebraic curves

Türkü Özlüm Çelik, Samantha Fairchild, Yelena Mandelshtam

<http://arxiv.org/abs/2211.00781>

Counting and Computing Join–Endomorphisms in Lattices (Revisited)

Carlos Pinzón, Santiago Quintero, Sergio Ramírez, Camilo Rueda, Frank Valencia

<http://arxiv.org/abs/2211.00886>

Elliptic asymptotics for the complete third Painlevé transcendents

Shun Shimomura

<http://arxiv.org/abs/2211.00904>

A family of quantum walks on a finite graph corresponding to the generalized weighted zeta function

Ayaka Ishikawa

<http://arxiv.org/abs/2211.00932>

Klein–Gordon particles in Som–Raychaudhuri cosmic string spacetime with space–like dislocation: vorticity–energy and charge–energy correlations

Omar Mustafa

<http://arxiv.org/abs/2211.01114>

On the modulo p zeros of modular forms congruent to theta series

Berend Ringeling

<http://arxiv.org/abs/2211.01148>

On Infinite Series of Bessel functions of the First Kind: $\sum_{\nu} J_{N\nu+p}(x)$, $\sum_{\nu} (-1)^{\nu} J_{N\nu+p}(x)$

Suk Hyun Sung, Robert Hovden

<http://arxiv.org/abs/2211.01285>

FeynGKZ: a Mathematica package for solving Feynman integrals using GKZ hypergeometric systems

B. Ananthanarayan, Sumit Banik, Souvik Bera, Sudeepan Datta

<http://arxiv.org/abs/2211.01312>

The random Weierstrass zeta function II. Fluctuations of the electric flux through rectifiable curves

Mikhail Sodin, Aron Wennman, Oren Yakir

<http://arxiv.org/abs/2211.01586>

Spectral theory of the Nazarov–Sklyanin Lax operator

Ryan Mickler, Alexander Moll

<http://arxiv.org/abs/2211.01899>

Formally Self-Adjoint Hamiltonian for the Hilbert-Pólya Conjecture
Enderalp Yakaboylu

<http://arxiv.org/abs/2211.02049>

Towards a change of variable formula for "hypergeometrization"
Petr Blaschke

<http://arxiv.org/abs/2211.02447>

Applications of transcendental number theory to decision problems for hypergeometric sequences
George Kenison

<http://arxiv.org/abs/2211.02518>

Remarks on Dunkl translations of non-radial kernels
Jacek Dziubański, Agnieszka Hejna

<http://arxiv.org/abs/2211.02557>

Solutions of $(1+1)$ -dimensional Dirac equation associated with exceptional orthogonal polynomials and the parametric symmetry
Suman Banerjee, Rajesh Kumar Yadav, Avinash Khare, Nisha Kumari, Bhabani Prasad Mandal

<http://arxiv.org/abs/2211.02787>

One-point asymptotics for half-flat ASEP
Evgeni Dimitrov, Anushka Murthy

<http://arxiv.org/abs/2211.02844>

A reverse duality for the ASEP with open boundaries
Gunter M. Schütz

<http://arxiv.org/abs/2211.03166>

Hypergeometric functions for Dirichlet characters and Peisert-like graphs
Anwita Bhowmik, Rupam Barman

<http://arxiv.org/abs/2211.03326>

Perturbation of discriminant for one-dimensional discrete Schrödinger operator with sparse periodic potential
Masahiro Kaminaga

<http://arxiv.org/abs/2211.03405>

Painlevé-II approach to binary black hole merger dynamics: universality from integrability
José Luis Jaramillo, Badri Krishnan

<http://arxiv.org/abs/2211.03678>

On values of the Bessel function for generic representations of finite general linear groups
Elad Zelingher

<http://arxiv.org/abs/2211.03914>

The defocusing NLS equation with nonzero background: Painlevé asymptotics in two transition regions
Zhaoyu Wang, Engui Fan

<http://arxiv.org/abs/2211.04650>

A study of nonlinear irregular singular differential equations by Borel summable functions and an

application to Painlevé equations
Sunao Ouchi

<http://arxiv.org/abs/2211.04749>

Modulo d extension of parity results in Rogers–Ramanujan–Gordon type overpartition identities
Kağan Kurşungöz, Mohammad Zadehdabbagh

<http://arxiv.org/abs/2211.04792>

Relationship of the Green's functions related to the Hill's equation coupled to different boundary value conditions

Alberto Cabada, Lucía López–Somoza, Mouhcine Yousofi

<http://arxiv.org/abs/2211.04889>

Exponential convergence of sum-of-squares hierarchies for trigonometric polynomials

Francis Bach, Alessandro Rudi

<http://arxiv.org/abs/2211.04907>

The Tamagawa number conjecture and Kolyvagin's conjecture for motives of modular forms

Matteo Longo, Stefano Vigni

<http://arxiv.org/abs/2211.04950>

Geometric Properties of Generalized Hypergeometric Functions

K. Chandrasekran, D. J. Prabhakaran

<http://arxiv.org/abs/2211.05280>

Exceptional theta functions

Aaron Pollack

<http://arxiv.org/abs/2211.05587>

Random density matrices: Analytical results for mean fidelity and variance of squared Bures distance

Aritra Laha, Santosh Kumar

<http://arxiv.org/abs/2211.05603>

Rogue waves and their patterns in the vector nonlinear Schrödinger equation

Guangxiong Zhang, Peng Huang, Bao–Feng Feng, Chengfa Wu

<http://arxiv.org/abs/2211.05765>

The Bessel zeta function

M. G. Naber, B. M. Bruck, S. E. Costello

<http://arxiv.org/abs/2211.05808>

The Zeta Function for the Triangular Potential

M. G. Naber

<http://arxiv.org/abs/2211.06206>

Theoretical error estimates for computing the matrix logarithm by Padé–type approximants

Lidia Aceto, Fabio Durastante

<http://arxiv.org/abs/2211.06264>

Zeros of Dirichlet L –functions near the critical line

George Dickinson

<http://arxiv.org/abs/2211.06556>

Asynchronous progressive iterative approximation method for least-squares fitting
Nian-Ci Wu, Cheng-Zhi Liu

<http://arxiv.org/abs/2211.06611>

Mean convergence of Fourier-Akhiezer-Chebyshev series
Manuel Bello Hernández, Alejandro del Campo López

<http://arxiv.org/abs/2211.07086>

Totally real algebraic integers in short intervals, Jacobi polynomials, and unicritical families in arithmetic dynamics
Chatchai Noytaptim, Clayton Petsche

<http://arxiv.org/abs/2211.07155>

p -adic hypergeometric function related with p -adic multiple polylogarithms
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<http://arxiv.org/abs/2211.07226>

The closed span of some Exponential system E_Λ in the spaces $L^p(\gamma, \beta)$, properties of a Biorthogonal family to E_Λ in $L^2(\gamma, \beta)$, Moment problems, and a differential equation of Carleson
Elias Zikkos

<http://arxiv.org/abs/2211.07407>

Complete Decomposition of Symmetric Tensors in Linear Time and Polylogarithmic Precision
Pascal Koiran, Subhayan Saha

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The α - η - κ - μ Fading Model: An Exact Statistical Representation
Pranay Bhardwaj, Eesha Santosh Karnawat, S. M. Zafaruddin

<http://arxiv.org/abs/2211.07594>

Solvable random matrix ensemble with a logarithmic confining potential
Wouter Buijsman

<http://arxiv.org/abs/2211.07856>

Linear q -difference, difference and differential operators preserving some \mathcal{A} -entire functions
Jiaxing Huang, Tuen Wai Ng

<http://arxiv.org/abs/2211.07996>

Cores of partitions in rectangles
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A study on Horn matrix functions and its confluent cases
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M. Matushko, A. Zotov

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Mean values of the logarithmic derivative of the Riemann zeta-function near the critical line
Fan Ge

<http://arxiv.org/abs/2211.08594>

Orthogonal Polynomials Quadrature Algorithm (OPQA): A Functional Analytical Approach to Bayesian Inference

Lilian Wong

<http://arxiv.org/abs/2211.08663>

Continued fractions of cubic Laurent series

Dmitry Badziahin

<http://arxiv.org/abs/2211.08973>

Friable integers and the Dickman ρ -function

Ofir Gorodetsky

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Analytic Extension of Keiper–Li Coefficients

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Eric D'Hoker, Martijn Hidding, Oliver Schlotterer

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On bi-variate poly-Bernoulli polynomials

Claudio Pita-Ruiz

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Ground state solutions for weighted biharmonic problem involving non linear exponential growth

Brahim Dridi, Rached Jaidane

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More Zero-Free Regions for Fractional Hypergeometric Zeta Functions

Demessie Ergabus Birmechu, Hunduma Legesse Geleta

<http://arxiv.org/abs/2211.10348>

On the Injectivity of the Shifted Funk–Radon Transform and Related Harmonic Analysis

Boris Rubin

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On meromorphic solutions of a second order differential equation proposed by Hayman

Yueyang Zhang

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On a Double Series Representation of the Natural Logarithm, the Asymptotic Behavior of Hölder Means, and an Elementary Estimate for the Prime Counting Function

Sinan Deveci

<http://arxiv.org/abs/2211.11042>

Report: Statistics of approximations to zeroes of ζ -function via truncated symmetrized Euler products

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Fourier series for the three-dimensional random flight

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<http://arxiv.org/abs/2211.11203>

Improved concentration of Laguerre and Jacobi ensembles

Yichen Huang, Aram W. Harrow

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Twisted mixed moments of the Riemann zeta function

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Sums of powers of integers and generalized Stirling numbers of the second kind

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Some Useful Collective Properties of Bessel, Marcum Q -Functions and Laguerre Polynomials

Hakan Ozturk, Fikret Anli, Abdelouahab Kadem

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Towards a Universal Gibbs Constant

John Cullinan, Santanu Antu

<http://arxiv.org/abs/2211.12697>

Geometric Properties of Functions Containing Derivatives of Bessel Functions

Sercan Kazımođlu, Kamaljeet Gangania

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The first negative Fourier coefficient of an Eisenstein series newform

Sebastián Carrillo

<http://arxiv.org/abs/2211.13232>

Radius of γ -Spirallikeness of order α for some Special functions

Sercan Kazımođlu, Kamaljeet Gangania

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A Multivariate Non-Gaussian Bayesian Filter Using Power Moments

Guangyu Wu, Anders Lindquist

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On Isomonodromic Deformation of Massive Ising Spinors

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Effect of local fractional derivatives on Riemann curvature tensor

Muhittin Evren Aydin

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Kohei Yamaguchi, Shintarou Yanagida

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Paul Jennings, Frank Nijhoff

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A symmetric triple product p -adic L -function
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Noriko Hirata-Kohno, Makoto Kawashima, Anthony Poëls, Yukiko Washio

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Poly-meromorphic Itô-Hermite functions associated with a singular potential vector on the punctured complex plane
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On the logarithmic derivative of characteristic polynomials for random unitary matrices
Fan Ge

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Binary theta functions and Borcherds products
Markus Schwagenscheidt, Brandon Williams

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The Kohn-Laplacian and Cauchy-Szegő projection on Model Domains
Der-Chen Chang, Ji Li, Jingzhi Tie, Qingyan Wu

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A Connection Between the Monogenicity of Certain Power-Compositional Trinomials and k -Wall-Sun-Sun Primes
Lenny Jones

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Safety Envelope for Orthogonal Collocation Methods in Embedded Optimal Control
Jean Pierre Allamaa, Panagiotis Patrinos, Herman Van der Auweraer, Tong Duy Son

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On the number variance of zeta zeros and a conjecture of Berry
Meghann Moriah Lugar, Micah B. Milinovich, Emily Quesada-Herrera

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Special Function Representation Of Dickson Polynomials
Robert Reynolds

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On Laplacian eigenvalue equation with constant Neumann boundary data
Yong Huang, Qinfeng Li, Qiuqi Li, Ruofei Yao

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Some congruences involving generalized Bernoulli numbers and Bernoulli polynomials
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An algorithmic approach to finding canonical differential equations for elliptic Feynman integrals
Christoph Dlapa, Johannes M. Henn, Fabian J. Wagner

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Entropy fluctuation formulas of Fermionic Gaussian states
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Recursion relation for Toeplitz determinants and the discrete Painlevé II hierarchy
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<http://arxiv.org/abs/2212.00070>

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Abd Raouf Chouikha

<http://arxiv.org/abs/2212.00208>

Haagerup bound for quaternionic Grothendieck inequality
Shmuel Friedland, Zehua Lai, Lek-Heng Lim

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A note on Dedekind zeta values at $1/2$
Neelam Kandhil

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On p -divisibility of Fourier coefficients of Siegel modular forms
Shoyu Nagaoka

<http://arxiv.org/abs/2212.01095>

Elementary Continued Fractions for Linear Combinations of Zeta and L Values
Henri Cohen

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From Fermionic spin–Calogero–Sutherland models to the Haldane–Shastry spin chain by freezing
Jules Lamers, Didina Serban

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A Lambert’s Problem Solution via the Koopman Operator with Orthogonal Polynomials
Julia Pasiecznik, Simone Servadio, Richard Linares

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Asymptotics for the Number of Random Walks in the Euclidean Lattice
Dorin Dumitraşcu, Liviu Suciu

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Jack polynomials, \hbar -dependent KP hierarchy and affine Yangian of $\mathfrak{gl}(1)$

Na Wang, Can Zhang, Ke Wu

<http://arxiv.org/abs/2212.01765>

Long-time and Painlevé asymptotics for the Degasperis–Procesi equation on the line
Xuan Zhou, Zhaoyu Wang, Engui Fan

<http://arxiv.org/abs/2212.01949>

Friable integers and de Bruijn’s approximation Λ
Ofir Gorodetsky

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Comments on 1+1d QCD with heavy adjoint quarks
Meseret Asrat

<http://arxiv.org/abs/2212.02195>

Stability of Cnoidal Waves for the Damped Nonlinear Schrödinger Equation
Paolo Antonelli, Boris Shakarov

<http://arxiv.org/abs/2212.02448>

The Multi-cluster Fluctuating Two-Ray Fading Model
José David Vega Sánchez, F. Javier López–Martínez, José F. Paris, Juan M. Romero–Jerez

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Colored multiple zeta values, WZ–pairs and some infinite sums
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c –functions and Macdonald polynomials
Laura Colmenarejo, Arun Ram

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Multiple soliton solutions and similarity reduction of a $(2+1)$ –dimensional variable–coefficient Korteweg–de Vries system
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Monk rules for type GL_n Macdonald polynomials
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Set-valued tableaux for Macdonald polynomials
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Fractionally integrated curve time series with cointegration
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Virtual Euler characteristics via topological recursion
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On Sharp Beckner’s Inequality for Axially Symmetric Functions on S^4

Tuoxin Li, Juncheng Wei, Zikai Ye

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Differentiation identities for hypergeometric functions
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C-polynomials and LC-functions: towards a generalization of the Hurwitz zeta function
Lahcen Lamgouni

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Implications of subconvexity bounds for the moments of zeta
Kevin Smith

<http://arxiv.org/abs/2212.04503>

The discrete Green-Schwarz mechanism in 6D F-Theory and Elliptic Genera of Non-Critical Strings
Markus Dierigl, Paul-Konstantin Oehlmann, Thorsten Schimannek

<http://arxiv.org/abs/2212.04833>

Hamiltonian representation of isomonodromic deformations of general rational connections on $\mathfrak{gl}_2(\mathbb{C})$
Olivier Marchal, Nicolas Orantin, Mohamad Alameddine

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The Fourier-Jacobi expansion of the singular theta lift
Eric Hofmann

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3D Bosons, 3-Jack polynomials and affine Yangian of $\mathfrak{gl}(1)$
Na Wang, Ke Wu

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Multipliers in the scale of periodic Bessel potential spaces with smoothness indices of different signs
Alexei A. Belyaev, Andrei A. Shkalikov

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Biorthogonal Renormalization
Elisabet Edvardsson, J. Lukas K. König, Marcus Stålhammar

<http://arxiv.org/abs/2212.06016>

Quantum Statistical Mechanics of Dissolving Vortices
N. S. Manton, Shiyi Wang

<http://arxiv.org/abs/2212.06110>

Notes on the lens integral pentagon identity
H. Kübra Bag, Osman Ergeç, Ilmar Gahramanov

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Zeta Functions for Tensor Codes
Giuseppe Cotardo

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Hikami's observations on unified WRT invariants and false theta functions

Toshiki Matsusaka

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On the convergence of Nekrasov functions

Paolo Arnaudo, Giulio Bonelli, Alessandro Tanzini

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Some notes on a Fibonacci–Lucas identity

Kunle Adegoke, Robert Frontczak, Taras Goy

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Explicit zero–free regions for the Riemann zeta–function

Michael J. Mossinghoff, Timothy S. Trudgian, Andrew Yang

<http://arxiv.org/abs/2212.06913>

Pseudoprocesses related to higher–order equations of vibrations of rods

Manfred Marvin Marchione, Enzo Orsingher

<http://arxiv.org/abs/2212.07012>

The pseudo–periods of the Weierstrass zeta–function

Mario Bonk

<http://arxiv.org/abs/2212.07349>

Markov duality and Bethe ansatz formula for half–line open ASEP

Guillaume Barraquand, Ivan Corwin

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On the Irreducibility of the Krawtchouk Polynomials

John Cullinan

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A class of functional identities associated to curves over finite fields

Giacomo Hermes Ferraro

<http://arxiv.org/abs/2212.07956>

High precision computation and a new asymptotic formula for the generalized Stieltjes constants

Sandeep Tyagi

<http://arxiv.org/abs/2212.07974>

On the log–concavity of the Wright function

Rui A. C. Ferreira, Thomas Simon

<http://arxiv.org/abs/2212.07984>

Symmetries of non–linear ODEs: lambda extensions of the Ising correlations

S. Boukraa, J.–M. Maillard

<http://arxiv.org/abs/2212.08381>

On the Jacobian Matrices of Generalized Chebyshev Polynomials

Ahmet İleri, Ömer Küçüksakallı

<http://arxiv.org/abs/2212.08574>

An infinite family of vector–valued mock theta functions

Nickolas Andersen, Clayton Williams

<http://arxiv.org/abs/2212.08592>

On the Convergence of Random Fourier–Jacobi Series in $L^{p,(\eta,\tau)}$ space

Partiswari Maharana, Sabita Sahoo

<http://arxiv.org/abs/2212.08760>

Type I Chebyshev polynomials

Ulises Fidalgo

<http://arxiv.org/abs/2212.08851>

Green’s Functions and Existence of Solutions of Nonlinear Fractional Implicit Difference Equations with Dirichlet Boundary Conditions

Alberto Cabada, Nikolay D. Dimitrov, Jagan Mohan Jonnalagadda

<http://arxiv.org/abs/2212.09112>

On the Dotsenko–Fateev complex twin of the Selberg integral and its extensions

Yury A. Neretin

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Fronts in the wake of a parameter ramp: slow passage through pitchfork and fold bifurcations

Ryan Goh, Tasso J. Kaper, Arnd Scheel, Theodore Vo

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Towards to solution of the fractional Takagi–Taupin equations. The Green function method

Murat O. Mamchuev, Felix N. Chukhovskii

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Schrödinger equation for two quasi–exactly solvable potentials

Bartolomeu D. B. Figueiredo

<http://arxiv.org/abs/2212.09341>

Fourier coefficients of Eisenstein series for $O^+(2, n + 2)$

Felix Schaps

<http://arxiv.org/abs/2212.09419>

Toward Butler’s conjecture

Donghyun Kim, Seung Jin Lee, Jaeseong Oh

<http://arxiv.org/abs/2212.09470>

Automated Search for Conjectures on Mathematical Constants using Analysis of Integer Sequences

Ofir Razon, Yoav Harris, Shahar Gottlieb, Dan Carmon, Ofir David, Ido Kaminer

<http://arxiv.org/abs/2212.09965>

Series acceleration formulas obtained from experimentally discovered hypergeometric recursions

Paul Levrie, John Campbell

<http://arxiv.org/abs/2212.09972>

Witten–Reshetikhin–Turaev invariants and indefinite false theta functions for plumbing indefinite H–graphs

Yuya Murakami

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Łojasiewicz exponent and pluricomplex Green function on algebraic sets

Leokadia Bialas–Ciez, Maciej Klimek

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Quantum vs Classical Birth and Death Processes; Exactly Solvable Examples
Ryu Sasaki

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Quantum vs classical Markov chains; Exactly solvable examples
Ryu Sasaki

<http://arxiv.org/abs/2212.10721>

Every Bit Counts: A New Version of Non–binary VT Codes with More Efficient Encoder
Tuan Thanh Nguyen, Kui Cai, Paul H. Siegel

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On Minima of Difference of Epstein Zeta Functions and Exact Solutions to Lennard–Jones Lattice Energy
Senping Luo, Juncheng Wei

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Padovan numbers which are concatenations of three repdigits
Kisan Bhoi, Prasanta Kumar Ray

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On Gosper–Karaji algebraic Identities
Hossein Teimoori Faal

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Restriction theorem for Fourier–Dunkl transform II: Paraboloid, sphere, and hyperboloid surfaces
P. Jitendra Kumar Senapati, Pradeep Boggarapu, Shyam Swarup Mondal, Hatem Mejjaoli

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An isospectral transformation between Hessenberg matrix and Hessenberg–bidiagonal matrix pencil without using subtraction
Katsuki Kobayashi, Kazuki Maeda, Satoshi Tsujimoto

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Green’s function estimates for a 2d singularly perturbed convection–diffusion problem: extended analysis
Sebastian Franz, Natalia Kopteva

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Massive Theta Lifts
Marcus Berg, Daniel Persson

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Quantum Bianchi–VII problem, Mathieu functions and arithmetic
A. P. Veselov, Y. Ye

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Exceptional Laurent biorthogonal polynomials through spectral transformations of generalized eigenvalue problems
Yu Luo, Satoshi Tsujimoto

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Asymptotic Relations Between Interpolation Differences and Zeta Functions

Michael I. Ganzburg

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On global in time self-similar solutions of Smoluchowski equation with multiplicative kernel

G. Breschi, M. A. Fontelos

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Concentration of the Langevin Algorithm's Stationary Distribution

Jason M. Altschuler, Kunal Talwar

<http://arxiv.org/abs/2212.12700>

JDNN: Jacobi Deep Neural Network for Solving Telegraph Equation

Maryam Babaei, Kimia Mohammadi Mohammadi, Zeinab Hajimohammadi, Kourosh Parand

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Evaluating the generalized Buchshtab function and revisiting the variance of the distribution of the smallest components of combinatorial objects

Claude Gravel, Daniel Panario

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Exact solution of the position-dependent mass Schrödinger equation with the completely positive oscillator-shaped quantum well potential

E. I. Jafarov, S. M. Nagiyev

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A new estimate for homogeneous fractional integral operators on the weighted Morrey space $L^{p,\kappa}$ when $\alpha p = (1 - \kappa)n$

Jingliang Du, Hua Wang

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Multifractal Analysis of generalized Thue–Morse trigonometric polynomials

Aihua Fan, Jörg Schmeling, Weixiao Shen

<http://arxiv.org/abs/2212.13255>

Improved Laguerre Spectral Methods with Less Round-off Errors and Better Stability

Shenghe Huang, Haijun Yu

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Applications of a class of transformations of complex sequences

John M. Campbell

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Stability of selfsimilar solutions to the fragmentation equation with polynomial daughter fragments distribution

M. A. Fontelos

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A remark on the q -hypergeometric integral Bailey pair and the solution to the star-triangle equation

Erdal Catak

<http://arxiv.org/abs/2212.13575>

The Dunkl oscillator on a space of nonconstant curvature: an exactly solvable quantum model with reflections

Angel Ballesteros, Amene Najafizade, Hossein Panahi, Hassan Hassanabadi, Shi-Hai Dong

<http://arxiv.org/abs/2212.13601>

q -deformed coherent states associated with the sequence $x_n^{q,\alpha} = (1 + \alpha q^{n-1})_q$

Othmane El Moize, Zouhair Mouayn, Khalid Ahbli

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Conjugate Bayesian analysis of compound-symmetric Gaussian models

Zachary M. Pisano

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Special values of spectral zeta functions of graphs and Dirichlet L -functions

Bing Xie, Yigeng Zhao, Yongqiang Zhao

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Ronkin/Zeta Correspondence

Takashi Komatsu, Norio Konno, Iwao Sato, Kohei Sato

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Properties of some elliptic Hill's potentials

Wei He, Peng Su

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Refinements of asymptotics at zero of Brownian self-intersection local times

A. A. Dorogovtsev, N. Salhi

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Kampé de Fériet hypergeometric functions over finite fields

Ryojun Ito, Satoshi Kumabe, Akio Nakagawa, Yusuke Nemoto

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The Cauchy problem for the generalized hyperbolic Novikov-Veselov equation via the Moutard symmetries

Alla Yurova, Artyom Yurov, Valerian Yurov

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Bayesian Interpolation with Deep Linear Networks

Boris Hanin, Alexander Zlokapa

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A symmetric decomposition of the Boros-Moll polynomials

Guo-Niu Han, Shi-Mei Ma, Yeong-Nan Yeh

<http://arxiv.org/abs/2212.14512>

Matrix-valued Cauchy bi-orthogonal polynomials and a novel noncommutative integrable lattice

Shi-Hao Li, Ying Shi, Guo-Fu Yu, Jun-Xiao Zhao

<http://arxiv.org/abs/2212.14645>

Flat connection on four-dimensional lattice, related matrix difference equations and their solutions

H. Boos, A. P. Isaev

Topic #9 ——— OP – SF Net 30.1 ——— January 15, 2023

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 30.2 should be sent by March 1, 2023.

OP–SF NET is the electronic newsletter of the SIAM Activity Group on Special Functions and Orthogonal Polynomials (SIAG/OPSF). 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 OP–SF Talk which is currently managed and moderated by Howard Cohl (howard.cohl@nist.gov). Anyone wishing to be included in the mailing list (SIAG/OPSF members and non–members alike) should send an email expressing interest to him. Bonita Saunders also posts the Newsletter through SIAM Engage (SIAG/OPSF) which is received by all SIAG/OPSF members.

OP–SF Talk is a listserv associated with SIAG/OPSF which facilitates communication among members, non–members and friends of the Activity Group. To post an item to the listserv, send e–mail to howard.cohl@nist.gov.

WWW home page of this Activity Group:

<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 SIAM Engage (SIAG/OPSF) moderator

The appointed officers are:

Howard Cohl, OP–SF NET co–editor

Sarah Post, OP–SF NET co–editor

Bonita Saunders, Webmaster and SIAM Engage (SIAG/OPSF) moderator

*As of the date of the publication of OP–SF NET 30.1, the SIAG/OPSF elections had not occurred.

Topic #10 ——— OP – SF Net 30.1 ——— January 15, 2023

From: OP–SF Net Editors

Subject: Thought of the Month by **G. H. Hardy** on **Sir George Gabriel Stokes**

“In the first place it must be remembered that Stokes was primarily a mathematical physicist. He was also a most acute pure mathematician; but he approached pure mathematics in the spirit in which a physicist approaches natural phenomena, not looking for natural difficulties, but trying to explain those which forced themselves upon his attention.”

G. H. Hardy, 'Sir George Stokes and the Concept of Uniform Convergence', *Proceedings of the Cambridge Philosophical Society* **19** (1918), pp. 149–56.

Referenced by **Richard B. Paris**, in 'Stokes's Mathematical Work', in Mark McCartney, Andrew Whitaker, and Alastair Wood (eds), *George Gabriel Stokes: Life, Science and Faith* (Oxford, 2019).