Analysis day

in memory of Mikael Passare

September 24, 2014

Stockholms universitet

Organizers:
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ANALYSIS DAY IN MEMORY OF MIKAEL PASSARE

SEPTEMBER 24, 2014

RUM 32, BUILDING 5, KRÄFTRIKET
STOCKHOLM UNIVERSITY

Program

10:00–10:40 Ragnar Sigurdsson:
Complex Convexity and Analytic Functionals.

10:50–11:20 Jens Hoppe:
Minimal Hypersurfaces in Minkowski space.

11:30-12:00 Petter Johansson:
A Ronkin type function for the coamoeba

Lunch

13:00–13:30 Christer Kiselman:
Discrete convolution operators, the Fourier transformation, and its tropical counterpart: the Fenchel transformation.

13:40–14:10 Håkan Hedenmalm:
Weighted integrability of polyharmonic functions.

14:20–14:50 Jens Forsgård:
On the analyticity of A-hypergeometric functions in the parameter β.

Coffee break

15:20–15:50 Andrei Khrennikov:
Analysis on symplectic Hilbert space and inter-relation between the Schrödinger equation and the system of infinite-dimensional Hamilton equations.

16:00–16:30 Maurice Duits:
Random matrix fluctuations via recurrence coefficients for orthogonal polynomials.

(Visit to *Norra begravningsplatsen*)

Abstracts

Random matrix fluctuations via recurrence coefficients for orthogonal polynomials

Maurice Duits
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Eigenvalues of random matrices typically freeze when the size of the matrices becomes large, in the sense that their configuration tends to a deterministic equilibrium. The fluctuations around this equilibrium are governed by Gaussian random fields that are believed to be universal. In this talk I will discuss a new approach for establishing this universality in a wide class of models, called orthogonal polynomial ensembles, based on the recurrence coefficients for the orthogonal polynomials. This is joint work with Jonathan Breuer.

On the analyticity of A-hypergeometric functions in the parameter β.

Jens Forsgård
Department of Mathematics, Stockholm university
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We will consider solutions of the A-hypergeometric system represented by Euler–Mellin integrals, and describe their dependency on the parameter β. In particular offering an explanation to the formation of rank-jumps in the case when A describes a projective monomial curve. This is joint work with Christine Berkesch and Laura F. Matusevich.

Weighted integrability of polyharmonic functions.

Håkan Hedenmalm
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We consider L^p spaces with standard weight In the unit disk, indexed by the real parameter α. We then consider the biharmonic or more generally N-harmonic functions. A natural question is now when the integrability forces the function to vanish. We are led to consider new boundary value problems, and see what these mean for other planar domains.

Minimal Hypersurfaces in Minkowski space.

Jens Hoppe
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I will give a short introduction to Membrane Theory, discuss old and new results, and several open problems.

A Ronkin type function for the coamoeba.

Petter Johansson
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Given a Laurent polynomial f on $(C\backslash\{0\})^n$, the amoeba and coamoeba of f are the images of V under the mappings $(z_1, ., z_n) \mapsto (\log|z_1|, ., \log|z_n|)$ and $(z_1, ., z_n) \mapsto (\arg z_1, ., \arg z_n)$ respectively. The Ronkin function $R_f : \mathbb{R}^n \mapsto \mathbb{R}$ is the mean value of $\log|f(e^{x+iy})|$ for $x \in \mathbb{R}^n$ fixed over $y \in \mathbb{R}^n$. Passare and Rullgård showed that the Ronkin function of f is of importance for the understanding of the amoeba of f. We define a similar function where the mean value is taken over x instead of y. It turns out that this function is connected to a certain hyperplane arrangement associated to the coamoeba of f.

This is a joint work with Håkan Samuelsson.

Discrete convolution operators, the Fourier transformation, and its tropical counterpart: the Fenchel transformation

Christer Kiselman
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We study solvability of convolution equations for functions with discrete support in $\mathbf{R}^n$, a special case being functions with support in the integer points. The more general case is of interest for several grids in Euclidean space, like the body-centered and face-centered tesselations of three-space, as well as for the non-periodic grids that appear in the study of quasicrystals.

The theorem of existence of fundamental solutions by Boor, Höllig & Riemenschneider is generalized to general discrete supports using only elementary methods. We also study the asymptotic growth of sequences and arrays using the Fourier and Fenchel transformations.

Analysis on symplectic Hilbert space and inter-relation between the Schrödinger equation and the system of infinite-dimensional Hamilton equations.

Andrei Khrennikov
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We show that quantum formalism can be represented as the Hamiltonian formalism on the symplectic Hilbert space; in particular, quantum averages can be represented by Gaussian integrals on this space. This mathematical construction is related to the well known problem of hidden variables in quantum mechanics.

Complex Convexity and Analytic Functionals.

Ragnar Sigurdsson
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The title of my talk is the same as the title of the book by Mats Andersson, Mikael Passare and myself, which was published in 2004. In the talk I will begin by recalling a few memories of my long friendship with Mats and Mikael, tell the story of the book project and explain why it took so long time to complete. Then I will review a few results in the theory of complex convexity which have appeared since 2004 and state a few open questions of interest to me and hopefully to some others as well.