Faculty of Mathematics and Computer Science
Babeş-Bolyai University of Cluj-Napoca

Workshop dedicated to the memory of
Professor Gabriela Kohr
(3rd edition)

Geometric Function Theory in Higher Dimensions and Complex Banach Spaces

Book of Abstracts

1 – 3 December 2023
Cluj-Napoca, Romania

Invited Speakers

- **Leandro Arosio** - Tor Vergata University, Rome, Italy
- **Lucian Beznea** - Simion Stoilow Institute of Mathematics of the Romanian Academy, Bucharest, Romania
- **Teodor Bulboacă** - Babeş-Bolyai University, Cluj-Napoca, Romania
- **Martin Chuaqui Farrú** - Pontifical Catholic University of Chile, Santiago, Chile
- **Dan Coman** - Syracuse University, New York, USA
- **Mihai Cristea** - University of Bucharest, Romania
- **Paula Curt** - Babeş-Bolyai University, Cluj-Napoca, Romania
- **Tamás Darvas** - University of Maryland, USA
- **Ciprian Demeter** - Indiana University, Bloomington, USA
- **Mark Elin** - Braude College, Karmiel, Israel
- **Aurelian Gheondea** - Bilkent University, Ankara, Turkey and Simion Stoilow Institute of Mathematics of the Romanian Academy, Bucharest, Romania
- **Anatoly Golberg** - Holon Institute of Technology, Holon, Israel
- **Ian Graham** - University of Toronto, Canada
- **Pavel Gumenyuk** - Polytechnical University of Milan, Italy
- **Hidetaka Hamada** - Kyushu Sangyo University, Fukuoka, Japan
- **Ikkei Hotta** - Yamaguchi University, Japan
- **Mihai Iancu** - Babeş-Bolyai University, Cluj-Napoca, Romania
- **Fiana Jacobzon** - Braude College, Karmiel, Israel
- **Cezar Joiţa** - Simion Stoilow Institute of Mathematics of the Romanian Academy, Bucharest, Romania
- **Massimo Lanza de Cristoforis** - University of Padova, Italy

- **Laszlo Lempert** - Purdue University, West Lafayette, USA
- **Sergey Mikhailov** - Brunel University London, UK
- **Irina Mitrea** - Temple University, Philadelphia, USA
- **Takuya Murayama** - Kyushu University, Fukuoka, Japan
- **Camil Muscalu** - Cornell University, Ithaca, NY, USA
- **Victor Nistor** - Universite Lorraine, Metz, France
- **Mihai Pascu** - Transilvania University of Braşov, Romania
- **Cornel Pintea** - Babeş-Bolyai University, Cluj-Napoca, Romania
- **Radu Precup** - Babeş-Bolyai University, Cluj-Napoca, Romania
- **Eric Schippers** - University of Manitoba, Winnipeg, MB, Canada
- **David Shoikhet** - Holon Institute of Technology & Braude College, Karmiel, Israel
- **Toshiyuki Sugawa** - Tohoku University, Sendai, Japan
- **Wolfgang Wendland** - University of Stuttgart, Institute for Applied Analysis and Numerical Simulation & SIMTECH, Germany

Main organizer

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A Julia-Wolff-Carathéodory Theorem in convex domains of finite type

Leandro Arosio
Tor Vergata University, Rome, Italy

Abstract

The classical Julia-Wolff-Carathéodory shows that, if f is a holomorphic self-map of the disc, the derivative f' admits a positive nontangential limit near any boundary regular fixed point z, and the limit equals the dilation of f at z which can be computed in terms of the Poincaré distance. This result had several generalizations to several variables: in particular Rudin proved a version of it in the ball, Abate in strongly convex domains, and Abate-Tauraso in convex domains of D'Angelo finite type, adding a couple of technical assumptions. In this talk I will show how to prove the full theorem in the context of convex domains of D'Angelo finite type, using the strong asymptoticity of complex geodesics and the existence of horospheres. This result turns out to be related to the pluricomplex Poisson kernel introduced by Bracci-Patrizio-Trapani. This is a joint work with Matteo Fiacchi.

Nonlinear Dirichlet forms associated with quasiregular mappings

Lucian Beznea
Simion Stoilow Institute of Mathematics of the Romanian Academy, Bucharest, Romania

Abstract

We present a general procedure of constructing nonlinear Dirichlet forms in the sense introduced by Petra van Beusekom, starting from a strongly local, regular, Dirichlet form, admitting a carré du champ operator. As a particular case, we shall describe the nonlinear form associated with a quasiregular mapping.

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Geometric Properties of Some Special Functions

Teodor Bulboacă
Babeș-Bolyai University, Cluj-Napoca, Romania

Abstract

A widely investigated homogeneous second-order differential equation is given by

$$z^2\omega''(z)+qz\omega'(z)+\left[rz^2-p^2+(1-q)p\right]\omega(z)=0,$$

whose solutions are extensions of the *generalized Bessel function*, $p,q\in\mathbb{R}$ and $r\in\mathbb{C}$. The *generalized Bessel function of order* p is the particular solution of this differential equation which has the power series expansion

$$\omega_{p,q,r}(z)=\sum_{j=0}^{\infty}\frac{(-r)^j}{\Gamma(j+1)\Gamma\left(p+j+\frac{q+1}{2}\right)}\left(\frac{z}{2}\right)^{2j+p}.$$

It is worth mentioning that the above differential equation has a particular interest, and it allows us to know more information regarding the Bessel, modified Bessel, and spherical Bessel functions. This power series is convergent everywhere while it is not univalent in the open unit disk $\mathbb{U}:=\{z\in\mathbb{C}:|z|<1\}$. Bearing in mind also that special values of the parameters p, q and r will give us the well-known *Bessel, modified Bessel, and spherical Bessel functions*. One can observe that $\omega_{p,q,r}$ is not usually normalized, therefore we consider the following transformation

$$\mathrm{u}_{p,q,r}(z):=2^p\,\Gamma\left(p+\frac{q+2}{2}\right)z^{-\frac{p}{2}}\,\omega_{p,q,r}\left(\sqrt{z}\right),$$

and the series expansion of $\mathrm{u}_{p,q,r}$ has the form

$$\mathrm{u}_{p,q,r}(z)=\sum_{j=0}^{\infty}\frac{(-r)^j}{4^j(1)_j\left(p+\frac{q+2}{2}\right)_j}z^j,$$

where $\sigma:=p+(q+2)/2\in\mathbb{C}\setminus\{0,-1,-2,\dots\}$, $r\in\mathbb{C}\setminus\{0\}$, and $(\rho)_n$ represents the *Pochhammer symbol*. For $p,q,r\in\mathbb{C}$ satisfying the previous conditions, the *normalization of the of generalized Bessel functions* $\mathrm{U}_{\sigma,r}$ is defined by

$$\mathrm{U}_{\sigma,r}(z):=z\cdot\mathrm{u}_{p,q,r}(z)=z+\sum_{j=1}^{\infty}\frac{(-r)^j}{4^j(1)_j(\sigma)_j}z^{j+1},\ z\in\mathbb{U}.$$

We establish geometric properties, such as starlikeness and convexity of order α $(0\leq\alpha<1)$ in $\mathbb{U}$ for the *normalization of the generalized Bessel function*. In some previous paper we used for these purposes the L. Fejér (1936) and S. Ozaki's (1935) inequalities, while in the actual study we are using some properties of the gamma and digamma functions.

1. H. M. Zayed, T. Bulboacă, On some geometric properties for the combination of generalized Lommel-Wright function, J. Inequal. Appl. 2021, **158**(2021), 1–19, https://doi.org/10.1186/s13660-021-02690-z

2. H. M. Zayed, T. Bulboacă, Normalized generalized Bessel function and its geometric properties, J. Inequal. Appl. 2022, 158(2022), 1–26, https://doi.org/10.1186/s13660-022-02891-0

3. H. M. Zayed, T. Bulboacă, Geometric properties for the normalization of the generalized Bessel function, /submitted/

Best Möbius approximations of convex and concave mappings

Martin Chuaqui Farrú
Pontifical Catholic University of Chile, Santiago, Chile

Abstract

We study the best Möbius approximations to convex and concave conformal mappings of the disk, including the special case of mappings onto convex polygons. The crucial factor is the location of the poles of the BMAs. Finer details are possible in the case of polygons through special properties of Blaschke products and the prevertices of the mapping function.

This is joint work with Brad Osgood.

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Equidistribution problems for line bundles on projective manifolds

Dan Coman
Syracuse University, New York, USA

Abstract

Let L be a holomorphic line bundle on a projective manifold X and $H^0(X, L^p)$ be the space of global holomorphic sections of $L^p := L^{\otimes p}$. Suppose that h is a smooth Hermitian metric on L with positive curvature $c_1(L, h) > 0$. A foundational result of Tian states that certain Fubini-Study forms associated to the spaces $H^0(X, L^p)$, where L^p is endowed with the product metric $h^{\otimes p}$, converge as $p \to \infty$ to $c_1(L, h)$ in the $\mathcal{C}^\infty$ topology on X. Using this, Shiffman and Zelditch showed that, if the spaces $H^0(X, L^p)$ are endowed with Gaussian probability measures, then for almost every sequence of sections $\{S_p \in H^0(X, L^p)\}_{p\geq 1}$ the zero divisors $\frac{1}{p}[S_p = 0] \to c_1(L, h)$ as $p \to \infty$, in the weak sense of currents on X.

We discuss generalizations of these results to the case when the metric h on L is singular and the spaces $H^0(X, L^p)$ are endowed with quite general probability measures. These are based on joint works with Xiaonan Ma and George Marinescu, and with Turgay Bayraktar and George Marinescu.

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A note on the boundedness of the local index of quasiregular mappings

Mihai Cristea
University of Bucharest, Romania

Abstract

We introduce an integrability condition for the reciprocal of the Jacobian determinant which guarantees the boundedness of the local index of quasiregular mappings. We also study the uniform limits of quasiregular mappings for which such an integrability condition of the reciprocal of the Jacobian holds uniformly.

On some Subclasses of Biholomorphic Mappings

Paula Curt
Babeș-Bolyai University, Cluj-Napoca, Romania

Abstract

We study growth, distortion and inclusion properties for some subclasses of biholomorphic mappings in several complex variables (i.e. strongly starlike, strongly quasiconvex of type B and Janowski-type mappings defined with complex parameters). We derive the Fekete-Szegö inequality for various Janowski-type classes of mappings in several complex variables.

Transcendental Okounkov bodies

Tamás Darvas
University of Maryland, USA

Abstract

We show that the volume of transcendental big (1,1)-classes on compact Kahler manifolds can be realized by convex bodies, thus answering questions of Lazarsfeld–Mustata and Deng. In our approach we use an approximation process by partial Okounkov bodies, and we study the extension of Kahler currents. (Joint work with R. Reboulet, M. Xia, D. Witt Nystrom, K. Zhang).

Bourgain's Lambda(p)-set problem for curved hypersurfaces

Ciprian Demeter
Indiana University, Bloomington, USA

Abstract

We construct exponential sums with frequencies supported on curved manifolds in Euclidean space, that exhibit high order square root cancellation. The method combines curvature with Bourgain's probabilistic approach from his famous Lambda(p)-set paper.

Non-Linear Resolvents of Holomorphically Dissipative Mappings

Mark Elin
Braude College, Karmiel, Israel

Abstract

In this talk I plan to present known and new results on holomorphically dissipative/accretive mappings and their resolvents.

Namely, a criterion for a mapping to be holomorphically accretive with given squeezing ratio as well estimates on its non-linear resolvent will be presented.

Following an idea of L.A. Harris, we prove an inverse function theorem for mappings admitted so-called one-sided estimates. This allows to obtain a distortion result for non-linear resolvents. Also we establish a covering result. In their turn, the distortion and covering theorems imply accretivity of resolvents with estimates on squeezing ratio.

Dedicated to the memory of Professor Gabriela Kohr

Localisation of Regularised and Multiview Support Vector Machine Learning

Aurelian Gheondea
Bilkent University, Ankara, Turkey and Simion Stoilow Institute of Mathematics of the Romanian Academy, Bucharest, Romania

Abstract

We present a few representer theorems for a localised version of the regularised and multiview support vector machine learning problem introduced by H.Q. Minh, L. Bazzani, and V. Murino, *Journal of Machine Learning Research*, **17**(2016) 1–72, that involves operator valued positive semidefinite kernels and their reproducing kernel Hilbert spaces. The results concern general cases when convex or nonconvex loss functions and finite or infinite dimensional input spaces are considered. We show that the general framework allows infinite dimensional input spaces and nonconvex loss functions for some special cases, in particular in case the loss functions are Gâteaux differentiable. Detailed calculations are provided for the exponential least squares loss functions that leads to partially nonlinear problems.

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Extremal length distortion and weak conformality

Anatoly Golberg
Holon Institute of Technology, Israel

Abstract

The notions of quasiconformality and quasiregularity in a domain are natural extensions of the notion of conformality. The automorphism $f(z) = z(\sqrt{|z|} + 1)/2$ of the unit disk provides a simple example of a quasiconformal mapping, which is conformal only at the origin. The interest to a question whether global quasiconformality or its generalizations can guarantee for a mapping to be conformal at a prescribed point has been raised more than 80 years ago starting from the papers by Menshoff and Teichmüller. There exist several equivalent definitions of quasiconformal and quasiregular mappings. Each of them involves certain tools. Among the most powerful methods for studying geometric features of quasiconformal and of quasiregular mappings is the method of extremal lengths (moduli) which goes back to the classical work of Ahlfors-Beurling. The goal of our talk is to present new inequalities for moduli of the families of curves (paths) involving the integrals containing the so-called directional dilatations.

An additional purpose of the talk is to discuss some local conditions that are weaker than conformal and present a wide range of illustrating examples. All such results can be regarded as Teichmüller-Wittich-Belinskiĭ type theorems.

Angular derivative problem for backward flow invariant domains of one-parameter semigroups.

Pavel Gumenyuk
Polytechnical University of Milan, Italy

Abstract

The talk is based on a joint work with Maria Kourou and Oliver Roth, University of Würzburg, Germany; ArXiv:2303.00700. We address a version of Ahlfors' angular derivative problem for hyperbolic petals, i.e. for simply connected domains on which every element of a given holomorphic semiflow acts as a hyperbolic automorphism. In particular, on any such domain, the semiflow extends in a unique way to a flow. There is a one-to-one correspondence between the hyperbolic petals of a one-parameter semigroup in the unit disk and its boundary regular fixed points other than the Denjoy-Wolff point. We find a necessary and sufficient condition for the premodel associated to a boundary regular fixed point σ to be regular. The notion of premodel was introduced in 2000 by Pietro Poggi-Corradini, Ann. Acad. Sci. Fenn. Math. 25. The regularity of the premodel means that the map fixing σ and mapping the unit disk conformally onto the corresponding hyperbolic petal has finite (and automatically non-vanishing) angular derivative at σ. Our condition is given in terms of the hyperbolic geometry of the petal and backward dynamics of the one-parameter semigroup.

Fekete-Szegö inequalities on the unit ball of a complex Banach space

Hidetaka Hamada
Kyushu Sangyo University, Fukuoka, Japan

Abstract

In this talk, we survey the recent results on the Fekete–Szegö inequalities for g-starlike mappings and for the first elements of g-Loewner chains on the unit ball of a complex Banach space. This is a joint work with Gabriela Kohr and Mirela Kohr.

Nonlinear resolvents and decreasing Loewner chains

Ikkei Hotta
Yamaguchi University, Japan

Abstract

In this talk we will discuss that nonlinear resolvents of infinitesimal generators on bounded and convex subdomains of $\mathbb{C}^n$ are decreasing Loewner chains. A special form of the Loewner differential equation obtained from this chains appears in the context of the limit of the multiple radial/chordal SLEs. Furthermore, we consider the problem of the existence of nonlinear resolvents on unbounded convex domains in $\mathbb{C}$. In the case of the upper half-plane, we obtain a complete solution by using that nonlinear resolvents of certain generators correspond to semigroups of probability measures with respect to free convolution.

The material for this talk is based on the joint work with Sebastian Schleißinger and Toshiyuki Sugawa.

On generalized parametric representation on $\mathbb{B}^n$

Mihai Iancu
Babeș-Bolyai University, Cluj-Napoca, Romania

Abstract

We consider biholomorphic mappings on the Euclidean unit ball $\mathbb{B}^n$ which embed into normal Loewner chains that have a time-dependent normalization at the origin. In particular, we present convergence results for the compact families of mappings with generalized parametric representation on $\mathbb{B}^n$ with respect to T and A, where T is the starting time and A is a time-dependent linear operator that determines the normalization.

This talk is based on joint work with Hidetaka Hamada (Kyushu Sangyo University, Fukuoka, Japan) and Gabriela Kohr (Babeş-Bolyai University, Cluj-Napoca, Romania).

A generalization of the Fekete–Szegö functional to Banach spaces and its properties

Fiana Jacobzon
Braude College, Karmiel, Israel

Abstract

We introduce the Fekete–Szegö type operator in the open unit ball of a complex Banach space and study its geometric and analytic properties. All the modifications of the Fekete–Szegö functional studied before are either projections or particular cases of the operator we introduce.

We investigate the connection of the Fekete–Szegö type operator with composition and inverting of mappings, generalized n-th root transform, as well as the unitary transform of mappings.

Also, we show that for a given mapping f, the Fréshet derivative of third order of the inverse mapping f^{-1} and of elements of the semigroup generated by f can be expressed by the Fekete–Szegö operator.

Based on the join work with Mark Elin.

Dedicated to the memory of Professor Gabriela Kohr

Deformations of singular function germs

Cezar Joiţa
Simion Stoilow Institute of Mathematics of the Romanian Academy, Bucharest, Romania

Abstract

We will talk about deformations of real or complex analytic functions with not necessarily isolated singular locus and about sufficient conditions for proving local triviality results. Joint work with Matteo Stockinger and Mihai Tibar.

A survey on the boundary behavior of the double layer potential in Schauder spaces in the frame of an abstract approach

Massimo Lanza de Cristoforis
University of Padova, Italy

Abstract

We provide a summary of the continuity properties of the boundary integral operator corresponding to the double layer potential associated to the fundamental solution of a *nonhomogeneous* second order elliptic differential operator with constant coefficients in Hölder and Schauder spaces on the boundary of a bounded open subset of $\mathbb{R}^n$. The purpose is two-fold. On one hand we try present in a single paper all the known continuity results on the topic with the best known exponents in a Hölder and Schauder space setting and on the other hand we show that many of the properties we present can be deduced by applying results that hold in an abstract setting of metric spaces with a measure that satisfies certain growth conditions that include non-doubling measures as in a series of papers by García-Cuerva and Gatto in the frame of Hölder spaces and later by the author.

Mapping spaces and holomorphic functions

Laszlo Lempert
Purdue University, West Lafayette, USA

Abstract

Consider a complex manifold X and a compact Hausdorff space S. Continuous maps from S to X form an infinite dimensional complex manifold. The talk will discuss two theorems concerning holomorphic functions on such mapping spaces, one reminiscent of the Monodromy theorem, the other of Liouville's theorem.

Evolution Anisotropic Periodic Variable-Coefficient Navier-Stokes Equations: Recent Progress

Sergey E. Mikhailov
Brunel University London, UK

Abstract

We consider the evolution (time-dependent) anisotropic Navier-Stokes equations with variable space-periodic tensor viscosity coefficient in $\mathbb{R}^n$, $n \geq 2$. Employing the Galerkin algorithm, we prove the existence of a global weak spatially-periodic solution for the Navier-Stokes system in a periodic Sobolev space. The solution uniqueness and regularity for small data or local in time are also discussed.

A Sharp Divergence Theorem with Non-tangential Traces

Irina Mitrea
Temple University, Philadelphia, USA

Abstract

The Integration by Parts Formula, which is equivalent with the Divergence Theorem, is one of the most basic tools in Analysis. Originating in the works of Gauss, Ostrogradsky, and Stokes, the search for an optimal version of this fundamental result continues through this day and these efforts have been the driving force in shaping up entire sub-branches of mathematics, like Geometric Measure Theory.

In this talk, I will review some of these developments (starting from elementary considerations to more sophisticated versions) and I will discuss recent results regarding a sharp divergence theorem with non-tangential traces. This is joint work with Dorina Mitrea and Marius Mitrea.

Some recent results on chordal Komatu-Loewner equation

Takuya Murayama
Kyushu University, Fukuoka, Japan

Abstract

In 1950, Y. Komatu tried to extend the Loewner differential equation toward finitely connected planar domains. After entering the 21st century, such an attempt began to draw the attention of some probabilists, who aim to apply it to the theory of (stochastic) Schramm-Loewner evolution (SLE). However, compared with the classical Loewner theory, the basis for the Komatu-Loewner equation was insufficient to develop complex analysis and stochastic calculus for SLEs. It was one of the problems that the moduli enter the picture. In this talk, I'll explain how this situation was overcome by some researchers. Their results correspond to Loewner's original "slit mapping theorem", but I'll also mention a result (of mine) which corresponds to general Loewner chains (such as in Pommerenke's famous book) in a finitely connected domain.

A new approach to the Fourier Extension Problem for the paraboloid

Camil Muscalu
Cornell University, Ithaca, NY, USA

Abstract

The plan of the talk is to describe a new approach to the so-called Restriction Conjectures, that Itamar Oliveira and I have developed recently. Without entering into details, this new point of view allows one to prove that (essentially) all the relevant conjectures (linear or multi-linear) are true, provided that one of the functions involved has a tensor structure.

Layer potentials on manifolds with cylindrical ends: the Laplace operator

Victor Nistor
Université de Lorraine, Metz, France

Abstract

We study the method of Layer Potentials on manifolds with cylindrical ends. This includes domains in $\mathbb{R}^n$ with outlets at infinity. One of the main difficulties is the characterization of the Fredholm properties of the resulting integral operators, which requires information on the behavior at infinity. Another difficulty is the nature of the inverse of the pseudodifferential operators on these spaces. We apply our results to the study of the Laplacian. This is joint work with Mirela Kohr and Wolfgang Wendland.

On the Bunkbed conjecture

Mihai Pascu
Transilvania University of Braşov, Romania

Abstract

The bunkbed conjecture (due to Pieter W. Kasteleyn, 1985) is a conjecture in percolation theory, which despite its simplicity is still open, although it had attracted the attention of many researchers in the field (van der Berg, Kahn, Häggström, Linusson, etc).

A "bunkbed graph" is a graph constructed by joining two identical copies of a given graph by "vertical" edges at certain vertices located on top of each other, the name being suggestive for the shape of a bunkbed.

The intuitive statement of the conjecture is that under removal of some of the edges (Bernoulli bond percolation, for example), the probability of two vertices to be connected is a monotone decreasing function of their graph distance, that is, closer points are more likely to remain connected.

In this talk, I will present a survey of some known results on the validity of the conjecture, and I will present some partial results (work in progress with the Ph.D. student A.I. Ţacă, Transilvania University of Braşov).

The action of the modified gradient flow on the sublevel sets of some smooth functions

Cornel Pintea
Babeș-Bolyai University, Cluj-Napoca, Romania

Abstract

The gradient flow of a bounded smooth function defined on a complete Riemannian manifold, which satisfies the Palais-Smale condition, is a one parameter semigroup. It pushes the regular sublevel sets down into regular sublevel sets, but doesn't generally permutes the regular level sets. However the flow of a slightly modified gradient vector field becomes a one-parameter group of diffeomorphisms which permutes the regular level sets. In this talk we try to embed the two and three dimensional unit balls within the evolution of some regular sublevel sets under the action of the modified gradient flow.

Localization of energies in Navier-Stokes models

Radu Precup
Babeș-Bolyai University, Cluj-Napoca, Romania

Abstract

We analyze a general class of coupled systems of Navier-Stokes type equations with variable coefficients and non-homogeneous terms of reaction type in the incompressible case. Existence of solutions satisfying the homogeneous Dirichlet condition in a bounded domain in $\mathbb{R}^n$, $n \leq 3$, and localization results of energies are obtained by using a variational approach and the fixed point index theory. Joint work with Mirela Kohr.

What is the Grunsky operator?

Eric Schippers
University of Manitoba, Winnipeg, MB, Canada

Abstract

The Grunsky operator is a matrix associated to a conformal map of the disk into the plane, which under analytic conditions on the mapping can be treated as a bounded operator. It arises in many contexts classically, for example potential theory and extremal problems for univalent functions. It has many (roughly) equivalent formulations, but its interpretation is not altogether obvious.

The Grunsky operator surfaces in some surprising places, such as Teichmuller theory, representation theory, and conformal field theory. I will give an exposition of some of the literature on the Grunsky operator up to the present, and illustrate its geometric meaning.

TBA

David Shoikhet
Holon Institute of Technology & Braude College, Karmiel, Israel

Abstract

TBA

Existence of nonlinear resolvents for unbounded convex domains

Toshiyuki Sugawa
Tohoku University, Sendai, Japan

Abstract

Let $(F_t)_{0\le t<+\infty}$ be a semigroup of holomorphic self-maps of a convex domain D in the complex plane (or, more generally, in $\mathbb{C}^n$). We denote by G the infinitesimal generator of F_t, namely, $G(z) = \lim_{t\to 0}(F_t(z) - z)/t$. The nonlinear resolvent $z = J_t(w)$ is defined as the solution to the equation $w = z - tG(z)$ in D. In this talk, we give basic results on the nonlinear resolvents on bounded convex domains. Then, we will discuss on the case of unbounded convex domains. The present talk will be based on the first part of the joint paper with I. Hotta and S. Schleissinger.

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An attempt to construct the Stokes flow in a domain with cylindrical end

Wolfgang L. Wendland
University of Stuttgart, Institute for Applied Analysis and Numerical Simulation & SIMTECH, Germany

Abstract

Based on existence results for the Stokes operator and its solution properties in manifolds with cylindrical ends by N. Große, M. Kohr, V. Nistor and W.L. Wendland, the Stokes flow in a three–dimensional compact domain Ω^+ with a circular opening Σ through which the fluid leaves Ω^+ and enters an unbounded cylindrical pipe. In Ω^+ the Stokes flow is modeled as a mixed boundary value problem whereas in the cylindrical end the velocities and pressure are constant on every straight line in cylindrical direction with initial values from the opening Σ of Ω^+. These values equal the velocities and pressure obtained from the mixed boundary values's solution in Ω^+ at the opening Σ.

Contributed Talk

g-Loewner chains and the Graham-Kohr extension operator in complex Banach spaces

Eduard Grigoriciuc
Babeș-Bolyai University & ICTP, Cluj-Napoca, Romania

Abstract

Starting from the recent results proved by I. Graham, H. Hamada, G. Kohr and M. Kohr, we focus our attention on the Graham-Kohr extension operator (introduced by I. Graham and G. Kohr in 2002) and its properties.

In particular, we prove that the Graham-Kohr extension operator preserves the first elements of g-Loewner chains on the unit disc to the first elements of g-Loewner chains on the domain $\Omega_{p,r}$ in a complex Banach space X, where $\Omega_{p,r} = \left\{(z_1, w) \in \mathbb{C} \times X : |z_1|^p + \|w\|_X^r < 1\right\}$ for $p, r \geq 1$.