Dear Colleagues!

Institute of Mathematics of the University of Georgia is pleased to invite you to the Online Tbilisi Analysis & PDE Seminar. The seminar is held bi-weekly on Mondays (at 16 : 00 GMT at 17 : 00 CET, at 20 : 00 local time in Tbilisi).

Talk on January 17, 2022

Speaker: Nikolai L. Vasilevski, Department of Mathematics, CINVESTAV, Mexico City, Mexico
https://www.math.cinvestav.mx/∼nvasilev/

The title of the lecture: On analytic type function spaces and direct sum decomposition of $L_2(D, d\nu)$

Abstract: Let D be either the unit disk $\mathbb{D}$ or $\mathbb{C}$, and let J be either $[0, 1)$ or $\mathbb{R}_+$, so that $D = J \times \mathbb{T}$, where $\mathbb{T}$ is the unit circle in $\mathbb{C}$. We set $\mathcal{H}$ for any weighted Hilbert space $L_2(D, d\nu)$, with the probability measure $d\nu(z) = \omega(|z|)dA(z)$, where $dA(z) = \frac{1}{\pi}dxdy$, $z = x + iy$, and whose radial weight function $\omega : D \to \mathbb{R}_+$ is such that the linear span of the monomials $z^p\overline{z}^q$, for all $p, q \in \mathbb{Z}_+$, is dense in $\mathcal{H}$.

Given any pair $(m, n) \in \mathbb{Z}_+ \setminus \{(0, 0)\}$, we denote by $\mathcal{A}^{(m,n)}$ the subspace of $\mathcal{H}$, which consists of all smooth functions f satisfying the equation $\frac{\partial^m}{\partial z^m}\frac{\partial^n}{\partial \overline{z}^n} f = 0$, and by $\mathcal{A}_k^{(m,n)}$ the subspace of $\mathcal{H}$, which consists of all smooth functions satisfying the equation $\left(\frac{\partial^m}{\partial z^m}\frac{\partial^n}{\partial \overline{z}^n}\right)^k f = 0$.
We call such functions (m, n)-*analytic*, and k-(m, n)-*polyanalytic*, respectively.

For particular values of (m, n), we have already known spaces of
- analytic functions $\mathcal{A} = \mathcal{A}^{(0,1)}$,
- k-polyanalytic functions $\mathcal{A}_k = \mathcal{A}^{(0,k)}$,
- anti-polyanalytic functions $\widetilde{\mathcal{A}} = \mathcal{A}^{(1,0)}$,
- k-anti-polyanalytic functions $\widetilde{\mathcal{A}}_k = \mathcal{A}^{(k,0)}$,
- harmonic functions $\mathsf{H} = \mathcal{A}^{(1,1)}$,
- k-polyharmonic functions $\mathsf{H}_k = \mathcal{A}^{(k,k)}$.

We develop a unified approach to the characterization of all these analytic type function spaces and prove, in particular, the following result.

Given any predefined "analytic quality of functions", $(m, n) \in \mathbb{Z}_+ \setminus \{(0, 0)\}$, the Hilbert space $L_2(D, d\nu)$ admits the following direct sum decomposition

$$L_2(D, d\nu) = \bigoplus_{k\in\mathbb{N}} \mathcal{A}_{(k)}^{(m,n)},$$

where $\mathcal{A}_{(k)}^{(m,n)} = \mathcal{A}_k^{(m,n)} \ominus \mathcal{A}_{k-1}^{(m,n)}$ are the spaces of the so-called true-k-(m, n)-polyanalytic functions.

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Time: 16 : 00 GMT (17 : 00 CET and 20 : 00 local time in Tbilisi)

How to join:

The seminar is organized on the **Cisco Webex Meetings**. If you are already registered, you do not need to register again. Otherwise, to join the seminar please send an e-mail to **seminarim@ug.edu.ge** or register here:

https://forms.gle/xfQJ9fg1uqe7CrZw6

You will then receive further information.

WEB of Seminar: https://www.ug.edu.ge/en/tbilisi-analysis-and-pde-seminars

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2. E. Shargorodsky, Department of Mathematics, King's College London
3. G. Tephnadze, Institute of Mathematics, University of Georgia, Tbilisi

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M. Tsaava, Institute of Mathematics, University of Georgia, Tbilisi

Technical support:

Z. Vashakidze, Institute of Mathematics, University of Georgia, Tbilisi