Bahçeşehir University, Istanbul, Türkiye
Analysis & PDE Center, Ghent University, Ghent, Belgium
Institute Mathematics & Math. Modeling, Almaty, Kazakhstan

"Analysis and Applied Mathematics"
Weekly Online Seminar

Seminar leaders:
Prof. Allaberen Ashyralyev (BAU, Istanbul),
Prof. Michael Ruzhansky (UGent, Ghent),
Prof. Makhmud Sadybekov (IMMM, Almaty)

Date: **Tuesday, January 23, 2024**
Time: 12.00-13.00 (Istanbul) = 10.00-11.00 (Ghent) = 15.00-16.00 (Almaty)

Zoom link: https://us02web.zoom.us/j/6678270445?pwd=SFNmQUIvT0tRaH-lDaVYrN3l5bzJVQT09, **Conference ID:** 667 827 0445, **Access code:** 1

Speaker:
Prof. Dr. Vladimir Mityushev
Cracow University of Technology, Kraków, Poland

Title: **Riemann-Hilbert problem for a multiply connected domain and its applications**

Abstract: In this talk, we discuss the exact solution of the scalar Riemann-Hilbert problem

$$\operatorname{Re} \lambda_k(t)\varphi(t) = g_k(t), \qquad |t - a_k| = r_k \quad (k = 1,2,\dots,n)$$

for an arbitrary circular multiply connected domain with Hölder continuous coefficients. The solution is obtained in terms of the conditionally convergent Poincaré θ_2 - series for the classical Schottky group. Connections with the $\mathbb{R}$-linear problem, the alternative Schwartz method, and the effective properties of two-dimensional random composites are discussed. Order/disorder in dispersed random media is quantitatively described using the Riemann-Hilbert problem on a flat torus.

Biography:
Vladimir Mityushev was born in Uralsk, Kazakhstan in 1958. He graduated from Kolmogorov boarding school at Moscow State University in 1975. Subsequently, he studied at Byelorussian State University in Minsk and obtained a Ph.D. in Mathematics in 1984. His academic pursuits continued with a habilitation degree from Poznan Technological University, Poland, in 1997 and the prestigious title of Professor of Mathematics in 2010.

Throughout his career, Vladimir Mityushev held various academic positions, including stints at Byelorussian Technological University in Minsk from 1984 to 1988 and Byelorussian State University from 1988 to 1991. He contributed to the field of mathematical sciences as a faculty member at Pedagogical University in Slupsk (Poland) from 1991 to 2004; from 2004 to

2021, he served as the Head of the Department of Mathematical Modeling and Computer Simulations at Pedagogical University in Krakow and Director of the Institute of Computer Science in 2020. Vladimir Mityushev extended his academic influence as a Guest Research Professor at IPGP P.-M. Curie University Paris 7, and Equipe Milieux Poreux, Sisyphe-Metis, Paris 6 (France) from 1998 to 2018. His commitment to advancing knowledge persists, as he has held a position at Cracow University of Technology since 2021 and a leader of the research group Materialica+.

The breadth of Vladimir Mityushev's research interdisciplinary interests spans various domains, including the effective properties of composites with deterministic and random structures, elliptic PDE, symbolic computations, boundary value problems, Riemann-Hilbert problems for multiply connected domains, Asymptotic methods, packing, deterministic and random graphs, representative volume elements, biomathematics, bioinformatics, porous media, permeability, diffusion, elasticity, thermoelasticity, mechanics of fracture, electroosmotic phenomena, viscous flow in wavy channelsand industrial mathematics.

His contributions comprise about 200 research papers and 16 books, including 4 as an editor.

Some recent publications:

- V. Mityushev, N. Rylko, Effective properties of two-dimensional dispersed composites. Part I. Schwarz's alternating method, Comput. Math. Appl. 111 (2022) 50-60.
- Cherkaev, V. Mityushev, N. Rylko, P. Kurtyka. The generalized Hashin – Shtrikman approach to Al/nano-TiC composite. Proceedings of the Royal Society A, 478 (2263), 20220164 (2022).
- Andrianov, S. Gluzman, V. Mityushev, (eds.), Mechanics and Physics of Structured Media: Asymptotic and Integral Methods of Leonid Filshtinsky, Elsevier, Academic Press, London, 2022.
- P. Drygas, V. Mityushev. Lattice sums for double periodic polyanalytic functions. Anal. Math. Phys.13 (2023), no.5: 75.
- K. Dosmagulova, V. Mityushev, and Zh. Zhunussova, On the Optimal Conductivity of Packed Two-Dimensional Dispersed Composites, SIAM Journal on Applied Mathematics (2023) 83:3, 985-999.
- V. Mityushev. High-order Contrast Bounds for Piezoelectric Constants of Two-phase Fibrous Composites. Multiscale Modeling & Simulation, 21(4), (2023) 1644-1666.