

Dear Colleagues!

V. Kupradze 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 Tuesdays at 20 : 00 local time in Tbilisi.

Talk on May 27, 2025

Speaker: Prof. Valery Smyshlyaev, University College London. https://profiles.ucl.ac.uk/29293-valery-smyshlyaev/publications

"Multiscale-type approximations for a class of asymptotically degenerating operators and their spectra"

Abstract: Solutions of multiscale problems typically oscillate at a microscale displaying a two-scale asymptotic behaviour. This poses a challenge for approximating the related operators and their spectra, as the corresponding limit operators appear to be "two-scale" and so act in different (larger) Hilbert spaces of functions of two variables. A key example is an elliptic operator with high-contrast periodic coefficients in \mathbb{R}^n , but there are diverse

examples of PDE and other models displaying similar features. In this talk, based on [1], we introduce an abstract scheme allowing to construct such approximations, accompanied by tight error estimates, for a wide class of asymptotically degenerating operators and their spectra. In particular, the above key example of high-contrast PDE models displays surprising links to signal processing via a novel L^2 -isometric two-scale interpolation operator of Whittaker-Shannon type. Joined work with Ilia Kamotski and Shane Cooper.

[1] S. Cooper, I.V. Kamotski, V.P. Smyshlyaev, Quantitative multiscale operator-type approximations for asymptotically degenerating spectral problems. arXiv:2307.13151 (2023)

Date: May 27, 2025 Time: 20 : 00 local time in Tbilisi; (Compare to your local time: https://www.timeanddate.com/worldclock/georgia/tbilisi);

How to join:

The seminar is organized on the **Google Meet Platform**. If you are already registered, you do not need to register again. Otherwise, to join the seminar please send an e-mail to **ug.seminar.kim@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

Organizers:

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

Secretary:

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



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