

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, November 12, 2024**

Time: 14.00-15.00 (Istanbul) = 12.00-13.00 (Ghent) = 16.00-17.00 (Almaty)

Zoom link: <https://us02web.zoom.us/j/6678270445?pwd=SFNmQUlvT0tRaHlDa-VYrN3I5bzJVQT09>, **Conference ID:** 667 827 0445, **Access code:** 1

### Speaker:

**Prof. Dr. Ravshan R. Ashurov**

*Institute of Mathematics of the Academy of Sciences of Uzbekistan, Uzbekistan*

**Title: New formulation of the inverse problem of determining the order of fractional derivatives in partial differential equations**

Abstract: Determining the unknown order of a fractional derivative in differential equations modeling various processes is an important problem of modern applied mathematics. It is often difficult to determine the order of a fractional derivative directly, since there is no available measuring device. In such cases, it is necessary to solve the inverse problem, which consists in determining this parameter using indirectly observed information about the solutions. In the last decade, this problem has been actively studied by many specialists. A number of interesting results have been obtained that have a certain applied significance. Analyzing the known results, we can conclude that in all these works, firstly, only the subdiffusion equation was considered and, secondly, the authors managed to prove only the uniqueness of the solution to the inverse problem under consideration. This report will give a brief overview of the most interesting works in this area, and will also propose a new formulation and methods for solving these inverse problems. It will be proven that in the new formulation, the solutions to the inverse problems are not only unique, but also exist. In this case, not only the subdiffusion equations will be considered, but also the fractional-wave equation, the Rayleigh-Stokes equations and some mixed-type equations.

### Biography:

Professor **Ravshan Ashurov** is currently head of laboratory at the Institute of Mathematics of the Academy of Science of Uzbekistan. He studied at Moscow State University, receiving

his PhD from there in 1982 and a Doctor of Science also from there in 1992. He has worked as a scientific researcher or visiting scientist at a number of institutions including Birmingham University in England, Vanderbilt University in the US, and the ICTP in Trieste. He has published more than 100 scientific papers as well as several books and monographs in English, Russian, and Uzbek. His research interests include fractional differential equations of ordinary and partial type, spectral theory of differential and pseudo-differential operators, harmonic analysis, and wavelet transforms.