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, April 9, 2024**
Time: 14.00-15.00 (Istanbul) = 13.00-14.00 (Ghent) = 16.00-17.00 (Almaty)

Zoom link: https://us02web.zoom.us/j/6678270445?pwd=SFNmQUlvT0tRaH-lDaVYrN3l5bzJVQT09, **Conference ID:** 667 827 0445, **Access code:** 1

Speaker:
Prof. Dr. Fatih Ecevit
Boğaziçi University, Istanbul, Türkiye

Title: **Computing the infinite tail in the Neumann series representation of high-frequency multiple scattering problems**

Abstract: We consider the high-frequency multiple scattering problem in the exterior of several convex obstacles. In this context, we review (1) the single scattering Galerkin boundary element methods (BEM) for the frequency independent approximation of the solutions, and (2) the Neumann series reformulation of multiple scattering problems along with the extension of single scattering Galerkin BEM to this case.

These strategies provide the guidelines for the frequency independent approximation of multiple scattering iterations. However, important additional issues arise in connection with the Neumann series as it may converge quite slowly or even diverge depending on the underlying geometrical configuration. In this connection, we present our ongoing work on Ray-stabilized Galerkin BEM which still uses the Neumann series reformulation even if it may diverge. Specifically, our approach is based on the calculation of a sufficiently large (depending on the geometry) partial sum of the Neumann series, and computation of the remaining infinite tail in just one solve through the construction of Ray-stabilized Galerkin BEM.

Time permitting, we also present ongoing work on its Bayliss-Turkel type approximation of the high-frequency scattering amplitude based on the method of stationary phase, and discuss the extension of this approach to multiple scattering scenarios in conjunction with the Ray-stabilized Galerkin BEM.

Biography:

Fatih Ecevit received his PhD in Mathematics from University of Minnesota, Twin Cities in 2005. He was a postdoc in the Scientific Computing Group at the Max Plank Institute of Mathematics in the Sciences, Leipzig, from 2005-2007. He has since been working at

Boğaziçi University, Department of Mathematics. Fatih Ecevit's research interests lie in classical analysis, partial differential equations, numerical analysis, integral equations, and semiclassical/microlocal analysis with particular emphasis on high-frequency scattering problems.