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, May 28, 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:

Dr. Rakkiyappan Rajan
Bharathiar University, Coimbatore, India

Title: **Stability Analysis and Robust Control for Time-Delay Systems**

Abstract: Time-delay systems are dynamic systems in which a delay between the input and output significantly affects system performance. These delays, whether constant or variable, discrete or distributed, often arise in engineering applications such as networked control systems, biological systems, and process control. Managing these delays is crucial for ensuring system stability and achieving robust control. One of the most common approaches for analyzing the stability of time-delay systems is the Lyapunov-Krasovskii functional method. This involves constructing a functional that decreases over time, ensuring system stability. The LKF method is powerful for both constant and time-varying delays. Lyapunov-Razumikhin approach uses a Lyapunov function that considers the delayed state explicitly, providing conditions under which the system remains stable despite the delay. It is often simpler to apply than the LKF method but might be less conservative. Various stability criteria have been developed, including the delay-independent and delay-dependent criteria. Delay-independent criteria provide stability conditions that do not depend on the magnitude of the delay, while delay-dependent criteria take the specific value of the delay into account for a more precise stability assessment.

Biography:

Rakkiyappan Rajan received the bachelor's degree in Mathematics from the Sri Ramakrishna Mission Vidyalaya College of Arts and Science, Coimbatore, India, in 2002, the master's degree in mathematics from the PSG College of Arts and Science, Bharathiar University, Coimbatore, in 2004, and the Ph.D. degree in stability analysis of neural networks from the

Department of Mathematics, the Gandhigram Rural Institute-Deemed University, Gandhigram, India, in 2011. From 2017 to 2018, he was a Research Professor at the Research Center for Wind Energy Systems. He is currently an Assistant Professor with the Department of Mathematics, Bharathiar University. He has authored more than 100 papers in international journals. His current research interests include the qualitative theory of stochastic and impulsive systems, neural networks, complex systems, and fractional order systems.