

Bahçeşehir University, Istanbul, Turkey  
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 9, 2023**

**Time:** 12.00-13.00 (Istanbul) = 11.00-12.00 (Ghent) = 15.00-16.00 (Almaty)

**Place:** Meeting room of Faculty of Engineering and Natural Sciences,  
Bahçeşehir University, D-415

**Zoom link:** <https://us02web.zoom.us/j/6678270445?pwd=SFNmQUIvT0tRaH-IDaVYrN3I5bzJVQT09>, **Conference ID:** 667 827 0445, **Access code:** 1

### Speaker:

**Dr. Gökhan Göksu**

*Yıldız Technical University, Turkey*

**Title: Integral Input-to-State Stability of Time-Delay Systems:  
Recent Results and Open Questions**

**Abstract:** Input-to-state stability (ISS) is a widely used tool to analyze the stability of non-linear dynamical systems affected by external disturbances. The ISS property imposes that the dynamical system evolves properly in the absence of disturbances and it also preserves this nominal behavior up to a reasonable response to disturbances in the sense that small disturbances generate small steady-state errors. One of its most famous extensions is integral ISS (iISS), which relates the solutions' norm to the input energy, rather than its amplitude. In this talk, we will start reviewing the basics of the ISS framework. We will then present more recent extensions of these results to time-delay systems and underline the key differences with finite-dimensional systems. We will thereafter present our recent results on iISS Lyapunov characterizations of time-delay systems and on growth rate conditions to ensure iISS of time-delay systems in cascade. We will finally list some open questions about the solutions and Lyapunov characterizations of ISS/iISS time-delay systems.

### Biography:

**Gökhan Göksu** was born in Istanbul, Türkiye, in 1988. He received his PhD in mathematical engineering in 2020 from Istanbul Technical University. He was a visiting researcher at Laboratoire des Signaux et Systèmes (L2S)-CentraleSupélec-Univ. Paris-Saclay between February 2019 and April 2020. He is currently an application unit lecturer with the department of mathematical engineering at Yıldız Technical University. His research interests include

switched linear systems, time-delay systems, finite-time stability, input-to-state stability and freeway traffic control.