

# OLMOUCKÝ SEMINÁŘ Z MATEMATICKÉ ANALÝZY

V úterý 24. 3. 2026 od 13.30 v učebně 5.068, PŘF UPOL, 17. listopadu 12

dr. Satyam Srivastava

z Ústavu matematiky a statistiky na PŘF MU v Brně

pronese přednášku na téma

## Existence Results on Fractional Boundary Value Problems: Coincidence Degree, Lyapunov Inequalities and Vallée-Poussin Type Methods

**Abstract:** Using the coincidence degree theory of Mawhin and constructing appropriate operators, we explore the existence of solutions for various boundary value problems involving different fractional derivatives. In this talk, we consider existence of solutions to higher-order Riemann–Liouville fractional differential equations with Riemann–Stieltjes integral boundary conditions at resonance.

Lyapunov inequalities approach, involves transforming the BVPs into an integral equation using Green's function. By estimating the bounds of Green's function, we derive inequalities and discuss the existence of solutions. Obtaining these estimates for Green's functions is not straightforward and requires rigorous analytical work. In this talk, we present recent works on Caputo fractional boundary value problems, concerning Lyapunov-type inequalities results.

We discuss results based on Vallée-Poussin theorem through three assertions for the fractional functional BVPs. We discuss our recent results for different class of fractional boundary value problem with different definitions of fractional derivatives. This theorem addresses the existence, uniqueness and positivity of solutions. We obtain necessary and sufficient conditions of negativity of Green's function to problem in form of assertion about differential inequality.

