Functional Analysis, Mathematical Physics, and Dynamical Systems

(FAMPDS)

Joint American-Ukrainian Virtual Colloquium Series

Spring 2021

Talk 2: *On the Smoothness of Weak Solutions of an Abstract Evolution Equation with a Scalar Type Spectral Operator*

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Abstract

Given the abstract evolution equation

$$y'(t) = Ay(t),\ t \geq 0, \tag{AEE}$$

with a *scalar type spectral operator* A in a complex Banach space, we find conditions on A, formulated exclusively in terms of the location of its spectrum in the complex plane, *necessary and sufficient* for all *weak solutions* of the equation, which a priori need not be differentiable, to be *infinite differentiable* or *Gevrey ultradifferentiable* of order $\beta \geq 1$, in particular *analytic* or *entire*, on $[0, \infty)$ or $(0, \infty)$. We also reveal certain inherent smoothness improvement effects and show that, if all weak solutions of the equation are Gevrey ultradifferentiable of orders less than one, then the operator is necessarily *bounded*.

We further provide characterizations of the generation of strongly differentiable and Gevrey ultradifferentiable scalar type spectral C_0-semigroups.

Friday, March 12, 10:00-11:00 AM (PST), 20:00-21:00 (EET)
Online via Zoom at
https://fresnostate.zoom.us/j/5233106532