

CMM PDE Seminar

Speaker: Argenis Mendez (Pontificia Universidad Católica de Valparaíso)

Título: On the fractional Zakharov-Kuznetsov equation.

Abstract:

In this talk, we will present some new results related to the regularity properties of the initial value problem (IVP) for the equation $\partial_t u + \partial_{x_1} (\Delta)^{\alpha/2} u + u \partial_{x_1} u = 0$, $0 \leq \alpha \leq 2$, $u(x, 0) = u_0(x)$, $x = (x_1, x_2, \dots, x_n) \in \mathbb{R}^n$, $n \geq 2$, $t \in \mathbb{R}$, (0.1) where $(\Delta)^{\alpha/2}$ denotes the n -dimensional fractional Laplacian.

In the particular case that $\alpha = 2$, the equation is known as the Zakharov-Kuznetsov-(ZK) equation and it was proposed by Zakharov and Kuznetsov as a model to describe the propagation of ion-sound waves in magnetic fields in dimension $n = 3$.

A property that enjoys the solutions of the ZK equation is Kato's smoothing effect. Roughly speaking, the solution to the initial value problem is, locally, one derivative smoother (in all directions) in comparison to the initial data.

The goal of this talk is to show that despite the non-local character of the operator $(\Delta)^{\alpha/2}$, the solution of the equation (0.1) is locally smoother. More precisely, it becomes $\alpha/2$ ' smoother in all directions.

As a byproduct we show the applicability of this result in establishing the propagation of localized regularity of the solutions of (0.1) in a suitable Sobolev space.

Date: August 16, 2022 at 12 Santiago time

Modalidad: Presencial en sala de seminarios del CMM, piso 7, o bien online via zoom:

<https://uchile.zoom.us/j/97687856555?pwd=MkZYZWpEY0YwUTBHT3ROK29ob1JYdz09>

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