PhD Pre-Defense

WEIGHTED INEQUALITIES IN FLUID MECHANICS AND GENERAL RELATIVITY: CARLEMAN ESTIMATES AND CUSPED TRAVELLING WAVES

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ORGANISER: UAM - ICMAT

ABSTRACT: In this seminar we will discuss some results on singular dispersive equations in two different flavors. First, we will see certain aspects of wave equations with coefficients that are very singular at the boundary of a manifold. Carleman inequalities and boundary observability, on the one hand, and Dirichlet-to-Neumann maps and fractional wave operators, on the other, are the central objects of study in this part strongly motivated by the study of geometric PDEs in General Relativity.

In the second part, we will deal with singular solutions to a model of shallow water waves and prove a recent conjecture in fluid mechanics. Here we will show a new strategy to construct singular solutions to equations with very low regularity that proves the existence of a highest, cusped, periodic travelling wave solution to the Whitham equation that is convex between consecutive crests.