2^{nd} International Meeting on Differential Equations and Applications

March 9-11, 2026 • Madrid (Spain)

The Quintic Wave Equation with Kelvin-Voigt Damping: Strichartz Estimates, Well-posedness and Global Stabilization

Marcelo Moreira Cavalcanti

Universidade Estadual de Maringá

This talk is concerned with the critical quintic wave equation in a 3D bounded domain subject to locally distributed Kelvin-Voigt damping. The study addresses two major mathematical challenges: the severe loss of derivatives caused by localized thermo-viscous dissipation and the aggressive nature of the critical nonlinear term. First, we establish a robust well-posedness theory for arbitrarily large initial data. By shifting the analysis to the frequency space via a Littlewood-Paley decomposition, we employ Bernstein's inequalities to lift the damping term into an L^2 framework, thereby allowing Strichartz estimates to apply. In the second part, we prove the uniform exponential stabilization of the energy. To overcome the reduction of the residual to the H^{-2} level due to the Kelvin-Voigt mechanism, we use the microlocal defect measure framework. The core of our stabilization proof relies on combining the critical Strichartz regularity $L_t^4 L_x^{12}$ with a sharp Unique Continuation Property (UCP) to close the observability argument. Furthermore, we show that this microlocal mechanism is compatible with non-invasive damping geometries of arbitrarily small Lebesgue measure, thereby circumventing the geometric obstruction posed by trapped rays.