SPRING COLLOQUIUM SERIES

DR. JOSE MORALES

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COMPUTATIONAL METHODS FOR QUANTUM AND SEMI-CLASSICAL KINETIC EQUATIONS

Abstract: My group works in the broad research lines of mathematical and computational methods for the study of kinetic equations modeling phenomena such as electron transport in semiconductors and open quantum systems, which are then solved through different numerical methods, either deterministic or stochastic. The aforementioned equations can study the respective physical phenomena at either a semi-classical level (for example, via a Boltzmann equation) or a quantum scale (for example, via a density matrix or a Wigner model). Some specific research topics are the development of Discontinuous Galerkin methods for the Boltzmann model of electrons in semiconductors, the study of numerical boundary conditions for Galerkin methods analog to the analytical ones for the reflection over rough boundaries, the homogenization of boundary layers in Boltzmann-Poisson, uncertainty quantification through Stochastic Galerkin techniques, as well as the study of open quantum systems by different computational methods: Discontinuous Galerkin with either polynomial or non-polynomial bases, Monte Carlo Methods, as well as Physics-Informed Neural Networks.

FRIDAY APRIL 25

3:00PM - 4:00PM

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UTSA Mathematics