数学与系统科学研究院

计算数学所学术报告

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报告题目： **Level Set Methods for Capturing Semi-classical Dynamics in Schroedinger Equations**

邀请人： 崔俊芝院士

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报告地点： 科技综合楼三层 311

计算数学所报告厅

Abstract: In the computation of wave propagation, when the wave field is highly oscillatory, direct numerical simulation of the wave dynamics can be

prohibitively costly and approximate models must be used. The resulting approximate models are often nonlinear, and the corresponding classical entropy or viscosity type solutions are not adequate in describing the wave behavior beyond the singularity, where multi–solutions in physical space need to be captured. In this talk we review recently developed level methods for computing multi– valued solutions for some nonlinear balance laws, and then present an application to capturing semi–classical limits in Schroedinger equations with different potentials. We discuss the essential ideas behind the techniques, the coupling of these techniques to handle several canonical potentials, including the phase space based level set method for given potentials; the field space based level set method for self–consistent potentials governed by the Poisson equation; as well as the Bloch–band based level set method for periodic potentials. The relations between computed multi–valued solutions and desired physical observables are established. One and two–dimensional numerical results will be presented.