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Decomposition of Nonlocal Norms and Quantitative Dependence Analysis for Nonlocal Diffusion Models

Abstract: In this talk, several decomposition properties for nonlocal norms of double integrals arising from nonlocal models will be presented. Based on it, how the equivalence between the energy norm and the Sobolev space norm depends on the horizon and other parameters for nonlocal diffusion models will be revealed. More results with quantitative dependence on the horizon and other parameters are further established, such as the nonlocal Poincaré inequality, the priori error estimation, and condition numbers of the stiffness matrix and preconditioned stiffness matrix by diagonal scaling on quasi-uniform meshes. Both the case of integrable kernels and the case of non-integrable kernels are considered herein.

日期：12月5日(一), 14:20 – 15:00
地點：科學一館 SA223