

Parabolic Capacity and Temporal Weighted Nonlocal Sobolev Space

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In this talk, we explore a parabolic capacity framework in temporally weighted L_p -spaces for parabolic initial-boundary value problems. We show that the parabolic capacity for the nonlocal heat operator can be defined using only the Hilbert norm from nonlocal parabolic variational inequalities. Our assumptions include normal ellipticity and Lopatinskii-Shapiro-type conditions. The weighted framework reduces initial regularity requirements and avoids boundary compatibility conditions, providing a smoothing effect on solutions. Our methods include interpolation and trace theory for anisotropic Slobodetskii spaces with temporal weights, as well as localization and perturbation techniques. The results apply to nonlocal parabolic Dirichlet spaces.