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L^p-parabolic regularity and non-degenerate Ornstein–Uhlenbeck type operators

Abstract
We prove sharp L^p-parabolic a-priori estimates for

$$\partial_t u + \sum_{i,j=1}^{d} c_{ij}(t)\partial^2_{x_i x_j} u = f$$

on $\mathbb{R}^{d+1}$ when the coefficients c_{ij} are locally bounded functions on $\mathbb{R}$. We slightly generalize the usual parabolicity assumption and show that still L^p-estimates hold for the second spatial derivatives of u. We also clarify the dependence of the constant appearing in such estimates from the parabolicity constant. When p is different from 2 the proof requires the use of the stochastic integral. Finally we extend our estimates to parabolic equations involving non- degenerate Ornstein–Uhlenbeck type operators.