
Abstract: In this paper we analyze the abstract parabolic evolutionary equations
\[ D_t^\alpha (u - x) + A(u)u = f(u) + h(t), \quad u(0) = x, \]
in continuous interpolation spaces allowing a singularity as \( t \downarrow 0 \). Here \( D_t^\alpha \) denotes the time-derivative of order \( \alpha \in (0,2) \).
We first give a treatment of fractional derivatives in the spaces \( L^p((0,T);X) \) and then consider these derivatives in spaces of continuous functions having (at most) a prescribed singularity as \( t \downarrow 0 \). The corresponding trace spaces are characterized and the dependence on \( \alpha \) is demonstrated. Via maximal regularity results on the linear equation
\[ D_t^\alpha (u - x) + Au = f, \quad u(0) = x, \]
we arrive at results on existence, uniqueness and continuation on the quasilinear equation. Finally, an example is presented.

AMS subject classifications: 35K90, 35C90

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