A weak Harnack inequality for fractional evolution equations with discontinuous coefficients

RICO ZACHER

Abstract. We study linear time fractional diffusion equations in divergence form of time order less than one. It is merely assumed that the coefficients are measurable and bounded, and that they satisfy a uniform parabolicity condition. As a main result we establish for nonnegative weak supersolutions of such problems a weak Harnack inequality with optimal critical exponent. The proof relies on new a priori estimates for time fractional problems and uses Moser's iteration technique and an abstract lemma of Bombieri and Giusti, the latter allowing to avoid the rather technically involved approach via BMO. As applications of the weak Harnack inequality we establish the strong maximum principle, the continuity of weak solutions at $t = 0$, and a uniqueness theorem for global bounded weak solutions.

Mathematics Subject Classification (2010): 35R09 (primary); 45K05 (secondary).