Publ. Math. Debrecen
100/3-4 (2022), 295–321
DOI: 10.5486/PMD.2022.8922

Multi-term time-fractional diffusion equation and system: mild solutions and critical exponents

By AIDYN KASSYMOV (Ghent), NIYAZ TOKMAGAMBETOV (Ghent) and BERIKBOL TOREBEK (Almaty)

Abstract. The paper deals with a multi-term time-fractional semi-linear diffusion equation and system. Firstly, the existence of local mild solutions to the Cauchy problems for the multi-term time-fractional diffusion equation and system are proved. Also, we obtain Fujita-type and Escobedo–Herrero-type critical exponents for the multi-term time-fractional diffusion equation and system, respectively. It is shown that the nonexistence results of solutions depend on the order of the lowest derivatives of the multi-term time-fractional diffusion equation and system.

AIDYN KASSYMOV &
NIYAZ TOKMAGAMBETOV &
BERIKBOL TOREBEK
DEPARTMENT OF MATHEMATICS: ANALYSIS,
LOGIC AND DISCRETE MATHEMATICS
GHENT UNIVERSITY
BELGIUM
AND
INSTITUTE OF MATHEMATICS
AND MATHEMATICAL MODELING
ALMATY
KAZAKHSTAN
AND
AL-FARABI KAZAKH NATIONAL UNIVERSITY
ALMATY
KAZAKHSTAN

Mathematics Subject Classification: 35R11, 34B10, 35R03.
Key words and phrases: Fujita-type critical exponent, Escobedo–Herrero-type critical exponent, multi-term equation, system of time-fractional diffusion equations, mild solution, local existence, fractional derivative.