Nonlocal heat equations with generalized fractional Laplacian

Igor Kossowski*, Bogdan Przeradzki**

* Institute of Mathematics, Lodz University of Technology, Poland
  E-mail: igor.kossowski@p.lodz.pl

** Institute of Mathematics, Lodz University of Technology, Poland
  E-mail: bogdan.przeradzki@p.lodz.pl

Let us consider initial-boundary value

\[ u_t + g(-\Delta)u = f(t, x, u), \quad u(t, \cdot)|_{\partial \Omega} = 0, \quad u(0, \cdot) = u_0, \quad (1) \]

where \( g(-\Delta) \) is the generalized fractional Laplacian, which is defined by spectral theorem (compare in [1]).

We aim to show that the problem (1) has a solution. To obtain the existence of solution we use two methods:

• direct method, which relies on using Fourier series;
• semigroup method.

Moreover, we present some numerical simulations of solutions to our problem. Above results was obtained by using Python.

References