

Solving Some Fractional PDEs by Using Theory of Semigroups of Operators

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Abstract

Fractional calculus is very useful in studying many real-life problems, especially is very effective when solving problems with memory effect issues. Here we present a specific approach in solving some fractional PDEs by using regularized derivatives and theory of generalized semigroups of operators. Fractional PDEs that we consider are reaction-advection-diffusion equations, inhomogeneous fractional evolution equations, time and time-space fractional wave equations with variable coefficients, fractional heat equation with variable thermal conductivity. In all cases, we prove that there exists a unique solution to the problem within a certain Colombeau generalized function space. We also give some justification of using our method.