

Solutions of Fractional Reaction-Diffusion Equations Used to Model the Growth and Spreading of Biological Species

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Abstract : Reaction-diffusion equations are commonly used in population biology to model the spread of biological species. In this paper, we propose a fractional reaction-diffusion equation, where the classical second derivative diffusion term is replaced by a fractional derivative of order less than two. Based on the symbolic computation system Mathematica, Adomian decomposition method, developed for fractional differential equations, is directly extended to derive explicit and numerical solutions of space fractional reaction-diffusion equations. The fractional derivative is described in the Caputo sense. Finally, the recent appearance of fractional reaction-diffusion equations as models in some fields such as cell biology, chemistry, physics, and finance, makes it necessary to apply the results reported here to some numerical examples.

Keywords : fractional partial differential equations, reaction-diffusion equations, adomian decomposition, biological species

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