

A NEW NUMERICAL APPROACH FOR SOLVING
TIME-FRACTIONAL PARTIAL DIFFERENTIAL EQUATIONS

Mehmet Gıyas SAKAR¹, Onur SALDIR²

¹*Yuzuncu Yil University, Van, Turkey*

²*Yuzuncu Yil University, Van, Turkey*

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Abstract

In this research, we introduced a new method based on variational iteration method with an auxiliary parameter for solving time-fractional partial differential equations. The convergence of method is showed by using Banach fixed point theorem. Maximum error bound is given. The fractional derivatives are taken in the Caputo sense. Some nonlinear time-fractional partial differential equations are solved by proposed method. The numerical results show that a new method is very effective and convenient.

Keywords: Time-fractional partial differential equation, Caputo derivative, Variational iteration method, Auxiliary parameter

References

- [1] I. Podlubny, Fractional differential equations, Academic Press, New York, 1999.
- [2] K. Diethelm, The analysis of fractional differential equations, Berlin Heidelberg, Springer-Verlag, 2010.
- [3] Z. M. Odibat, A study on the convergence of variational iteration method, Math. Comp. Modelling, 51 (9-10) (2010) 1181-1192.
- [4] M. G. Sakar, H. Ergören, Alternative variational iteration method for solving the time-fractional Fornberg-Whitham equation, Appl. Math. Model., 39 (14) (2015) 3972-3979.

¹giyassakar@hotmail.com

²onursaldir@yyu.edu.tr