Accepted Manuscript

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PII: S0377-0427(17)30206-6
DOI: http://dx.doi.org/10.1016/j.cam.2017.04.035
Reference: CAM 11115

To appear in: *Journal of Computational and Applied Mathematics*

Received date: 13 February 2017

Please cite this article as: A. Babaaghaie, K. Maleknejad, Numerical solution of integro-differential equations of high order by wavelet basis, its algorithm and convergence analysis, *Journal of Computational and Applied Mathematics* (2017), http://dx.doi.org/10.1016/j.cam.2017.04.035

Numerical solution of integro-differential equations of high order by wavelet basis, its algorithm and convergence analysis

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Abstract

This paper presents, for the first time, numerical solutions for this particular type of integro-differential equations. According to equations which will be introduced, suitable wavelet Galerkin method is provided using wavelet basis in the space $C^{\alpha}(R)\bigcap L^2(R)$, $\alpha > 0$, that $C^{\alpha}(R)$ is the Hölder space of exponent α . This approach has two advantages. First, the wavelets basis are arbitrary. It means that any differentiable wavelets basis can be used. Second, the desired orders for this equation are the reasons for involving a wide variety of this types of equations. The Algorithm and convergence analysis of this scheme are described. Numerical examples, plots and tablets of errors confirm the applicability and the validity of the proposed method.

Keywords: `Fredholm integro-differential equation; wavelet Galerkin method; wavelets basis; convergence analysis.`

2010 MSC: 65R20; 65G99; 65N30; 47A58.

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