
Wavelet-Based Solution to Some Time-Dependent Non-Linear Two-Point Initial Boundary Value Problems With Non-Periodic Boundary Conditions

H. N. NARANG[#] AND RAJIV K. NEKKANTI[†]

[#]*Computer Science Department, Tuskegee University, USA*

[†]*Department of Electrical Engineering, Tuskegee University, USA*

E-mail: [†]nekkantirajiv@hotmail.com

The Wavelet solution for boundary-value problems is relatively new and has been mainly restricted to the solutions in data compression, image processing and recently to the solution of differential equations with periodic boundary conditions. This paper is concerned with the wavelet-based Galerkin's solution to some time dependent non-linear two-point initial-boundary-value problems with non-periodic boundary conditions. The wavelet method can offer several advantages in solving the initial-boundary-value problems than the traditional methods such as Fourier series, Finite Differences and Finite Elements by reducing the computational time near singularities because of its multi-resolution character. In order to demonstrate the wavelet technique to non-linear non-periodic boundary value problems, we extend our prior research of solution of parabolic equations to two non-linear problems, a heat transfer through conduction, radiation and convection and a non-linear heat conduction problem. The results of the wavelet solutions are examined and they are found to compare favorably with the available exact solutions. This paper on the whole indicates that the wavelet technique is a strong contender for solving non-linear two-point boundary value problems with non-periodic boundary conditions.

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