

Haar wavelet method for solving evolution equations

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A numerical method based on the Haar decomposition for solving evolution equations is proposed. The principle of the method is as follows: the highest order derivative (in space and time) of the solution is projected into a finite-dimensional spacial Haar basis; the other derivatives (and the solution itself) are obtained through integrations. All these ingredients are then incorporated into the whole system discretized by collocation method.

Applicability of the recommended method is demonstrated by solving the 1D Burgers equation and the 1D Sine-Gordon equation. Numerical results obtained by computer simulation are compared with other available solutions. These calculations demonstrate that the accuracy of the Haar wavelet solutions is quite high even in the case of a small number of grid points.