Abstract

The beam is assumed partitioned into several finite elements and the deflection of the beam is required to be a positive quantity along the whole beam so that the related fundamental fourth-order ordinary differential equation can continuously holds good. In this paper, we apply Haar wavelet methods to solve finite-length beam differential equations with initial or boundary conditions known. An operational matrix of integration based on the Haar wavelet is established and the procedure for applying the matrix to solve the differential equations is formulated. The fundamental idea of Haar wavelet method is to convert the differential equations into a group of algebraic equations, which involves a finite number of variables. Illustrative example is given to confirm the efficiency and the accuracy of the proposed algorithm. The results show that the proposed way is quite reasonable when compared to exact solution.
Solving Finite Length Beam Equation by the Haar Wavelet Method

Reference

- E. Winkler, Die Lehre von der Elastizität und Festigleit, p. 182. Prague (1867).

Index Terms

Computer Science Applied Mathematics
Key words

Haar wavelets
Ordinary differential equation
finite-length beam
computationally attractive