Solution of Helmholtz Equation Using the Galerkin and Collocation Methods

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ABSTRACT

Numerical analysis is an area of mathematics and computer science that create, analyzes and implementation of algorithms for solving problems in mathematical physics numerically. Stationary systems modelled by elliptic partial differential equation could be linear nonhomogeneous as well as nonlinear equation. In this paper Galerkin and collocation of finite element method, in which the residuals are added to the Galerkin strong form and point's collocation variational equations, is developed to solve linear nonhomogeneous Helmholtz equation in one and two dimensions. The objective of this study is to present simple and accurate method for solving Helmholtz equations. Several numerical examples are conducted to test the validity and efficiency of the methods. The study compared the approximate solutions using various numbers of basis functions with the analytic solutions. Matlab software was utilized in the study.

Keywords: Galerkin method, Collocation method, Helmholtz equation, Functions, Numerical.

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