

FINITE ELEMENT GALERKIN METHOD USING PIECEWISE HERMITE BICUBICS FOR SOLVING POISSON'S EQUATION OVER THE UNIT SQUARE

This project focuses on finding approximate solutions to Poisson's equation in the unit square with Neumann and mixed boundary conditions using the Finite Element Galerkin (FEG) Method with piecewise Hermite bicubics. Applying the FEG method to Poisson's Equation yields a system of M^2 linear equations, where the approximate solution is calculated over a uniform partition of the unit square. Matrix decomposition algorithms can reduce this system to M discrete two-point boundary value problems, assuming two particular matrices are known. These matrices correspond to the eigenvalues and eigenvectors which are the solutions of an eigenvalue problem associated with the FEG discretization of a related two-point boundary value problem. These matrices have been found for Dirichlet boundary conditions. In this project, such matrices are determined for Neumann and mixed boundary conditions.