ABSTRACT

In applied mathematics and engineering sciences, partial differential equations play very important role especially for solving the physical problems. Elliptic partial differential equations are typically used to characterized steady-state boundary value problems. The one of the elliptic partial differential equation which describe such kind of characteristic in a two dimensional environment is Laplace equation. In this thesis different finite difference methods are introduced and used to approximate the solutions of the model problem by the programming in MATLAB. With the help of different plots , comparisons of tables and discussion the most efficient finite difference method is found. The thesis is summarized as bellow:

Chapter one contains introduction of the work, basic concepts and terminology related to study and classification of partial differential equation. Techniques to solve the partial differential equation are also given briefly. Chapter two is related to literature review. This chapter provides the details of elliptic partial differential equation, types of boundary condition and related derivation. Details of iterative methods with relaxation parameter and convergence criteria is also the part of this chapter. Different algorithms for iterative methods, resulting tables and graphs are presented in chapter three. Comparisons of iterative methods are the part of chapter four. We conclude this study with some comments in chapter five.