Application of the Boundary-Type Scheme in Analysis of Thick Plate Bending Problems

Elham Tahmasebi
Faculty member-Islamic Azad university,Shahreza Branch

elh_tahmasebi@yahoo.com

Abstract

There are many practical engineering problems which may be considered as boundary value problems (BVP). A typical BVP is governed by one or more 'differential' or 'integral' equation(s) within a specified domain, together with some conditions over the boundary of the domain. There are some situations where an analytical or a closed-form solution could be found for a given BVP, otherwise there might be no other choice but to employ an approximate procedure for the solution of the given BVP. The objective of this paper is to analysis thick plate including shear deformation through Trefftz boundary method. To achieve for this purpose, the Galerkin formulation is selected based on Hochard and Proslier presentation in 1992. In this paper, the indirect Trefftz method is discussed and the results show that the present methods are effective for both thin and thick plates. This article is organized as follows. In section 2, the basic equations based on the Reissner's plate theory are explained in detail. Then, in section 3, the complete solutions and complete sets are presented. In section 4, the Galerkin Method is introduced into the indirect Trefftz method and in section 5, some numerical examples are shown to illustrate the efficiency of the Trefftz method. Finally, in section 6, the conclusions are drawn, briefly.

Keywords: *Indirect Trefftz Boundary Method, Reissner's plate theory and thick plate*

Introduction

Trefftz method is the boundary-type solution procedure using T-complete functions satisfying the governing differential equation. Recently, the Trefftz boundary method has received the attention of researchers, since Trefftz functions satisfying the governing equations are nonsingular. It was firstly proposed by Trefftz in 1926. Since then, it has been studied by Cheung et al., Herrera et al., Jirousek et al., Kamiya et al., Piltner, Zielinski et al. and others. In the indirect formulation, the solutions of the problems to be solved are approximated by the superposition of the T-complete functions. Then, the unknown parameters are determined so that the approximate solutions satisfy the boundary conditions. Although in recent years various boundary solution methods have been applied to the thick plate bending problem [1-3], in the present work, we will restrict ourselves to the indirect Trefftz boundary approach and extend the method to thick plate bending problems.