**NUMERICAL SOLUTIONS OF BENDING AND BUCKLING OF STRUCTURAL MECHANICS**

**Author: Tului Gantulga and Aaron Burkhead**

Abstract

The purpose of this research is to simulate linear and nonlinear bending and buckling of structural phenomenon using a numerical technique called “Finite Difference Method” with computes. FDM splits a given region into “n” many node and applies a specified differential equation, which is turned into a function that takes in nodes with finite difference and calculates bending and buckling. Two main conditions are used, which are Boundary Condition and Initial Condition. Depending on the properties of the beam, i.e. simply supported or one end fixed, boundary and initial conditions vary. A boundary condition provides details on how the beam behaves under loading at its left and right boundaries. An initial condition only focuses on one end and provides as much information as possible with one variable missing and iterates until desired results are obtained. This is called the “Shooting Method.” The accuracy can be increased by using splines. Splines connect each node and provide at least first order continuity to the numerical result. Nonlinear theory of bending and buckling are also considered and solved through different methods. The results obtained from each theory is compared with the “true” or the analytical solution that is obtained using calculus.