

A numerical study of nonlinear deflection of a beam on a nonlinear elastic foundation

T.S. Jang, J.S. Park, B.Y. Moon

Summary

This paper is concerned with the numerical investigation of the beam deflection on a nonlinear elastic foundation. Traditionally, the problem of nonlinear beams has usually been examined by utilizing semi-analytical approaches involving the perturbations of small parameters or by such numerical techniques as nonlinear finite element methods. However, in this paper, the nonlinear beam problem is analyzed with the help of a new method proposed by the author (TS Jang): it involves a contraction of Banach fixed point theorem based on a transformed nonlinear integral equation. The proposed method, straightforward to apply, only requires a fairly simple iteration to find solutions of the nonlinear problem. It is shown that the numerical solutions of the method converge quickly, in contrast to traditional nonlinear solution procedures. Illustrative numerical examples are depicted, which reveal the effectiveness of the method.

