SPECIAL NUMERICAL METHOD TO DETERMINE THE ELASTIC CURVE OF SUPPORTED BEAMS OF VARIABLE CROSS-SECTION

István Bíró[1], Livija Cveticanin[2,3], Péter Szuchy[1]

[1] Department of Technology, Faculty of Engineering, University of Szeged, Szeged, Hungary
[2] Faculty of Technical Sciences, University of Novi Sad, Novi Sad, Serbia
[3] Donát Bánki Faculty, Obuda University, Budapest, Hungary
biro-i@mk.u-szeged.hu

Abstract

In the lecture a new numerical method to determine the elastic curve of the simply supported beams of variable cross-section is demonstrated. In general case it needs to solve strong nonlinear second order differential equations with prescribed boundary conditions. For numerical solution the initial values of the slope and the deflection of the end cross-section of the beam is necessary. For obtaining the initial values a lively procedure is developed: it is a special application of the shooting method because boundary value problems can be transformed into initial value problems. As a result of these transformations the initial values of the differential equations are obtained with high accuracy. Procedure is applied for calculating of elastic curve of a simply supported beam of variable cross-section. Results of this numerical procedure, analytical solution of the linearized version and finite element method are compared. It is proved that the suggested procedure yields technically accurate results.

Key words: elastic curve, simply supported beams of variable cross-section, initial guess for slope and deflection