NEW NUMERICAL PROCEDURE FOR DETERMINATION OF ELASTIC CURVE OF STATICALLY DETERMINATE AND INDETERMINATE BEAMS WITH VARIABLE CROSS SECTIONS

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ABSTRACT

In this lecture a new numerical procedure is developed for calculating the inclination angle and deflection as initial conditions of the end points of statically determinate and indeterminate beams. The method is based on the topology comparison of simple (hinge-roller combination) supported beam and a resemblant cantilever beam. Assuming that the support reactions of the beam are active forces, the virtual displacements at the points of the reaction forces are calculated. Based on these values the inclination angle is calculated. Several examples are considered and the suggested in this lecture, while the procedure is applied for various types of structures and loadings. The results, obtained by the suggested numerical procedure, are compared with analytical ones, and they are in good agreement.

Keywords: elastic curve, beams of variable cross section, initial guess for slope and deflection