Beam Elements on Linear Variable Two-Parameter Elastic Foundation

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Abstract text:

The traditional way to overcome the shortcomings of the Winkler foundation model is to incorporate spring coupling by assemblages of mechanical elements such as springs, flexural elements (beams in one-dimension, 1-D, plates in 2-D), shear-only layers and deformed, pretensioned membranes. This is the class of two-parameter foundations ? named like this because they have the second parameter which introduces interactions between adjacent springs, in addition to the first parameter from the ordinary Winkler?s model. This class of models includes Wieghardt, Filonenko-Borodich, Hetényi and Pasternak foundations. Mathematically, the equations to describe the reaction of the two-parameter foundations are equilibrium, and the only difference is the definition of the parameters. In order to analyse the bending behavior of a Euler-Bernoulli beam resting on linear variable two-parameter elastic foundation a (displacement) Finite Element (FE) formulation, based on the cubic displacement function of the governing differential equation, is introduced.

Key Words:

Beams; Elastic Foundations; Finite Element Method.

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