Differential Equation of a Visco-Elastic Beam Subjected to Bending

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Abstract text:

Generally, building materials exhibit a rheological behaviour as a direct consequence of their fundamental material properties such as elasticity, viscosity and plasticity. Based on the Kelvin--Voight model, governing the behaviour of the visco-elastic materials such as concrete, the present paper proposes the differential equation corresponding to the middle line of a visco-elastic beam subjected to bending. The derived equation is then used in the finite element analysis of the beam, also known as the Galerkin method. Following the solving procedure, a system of first order differential equations (expressed in terms of deformations and deformation velocities) is obtained, written in matrix form. The solution of such a system of equations could be obtained by means of the finite differences method.

Key Words:

Kelvin-Voight model; Galerkin method; finite differences method.

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