

## عنوان مقاله:

Simple Two Variable Refined Theory for Shear Deformable Isotropic Rectangular Beams

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## خلاصه مقاله:

In this paper, a displacement-based, variationally consistent, two variable refined theory for shear deformable beams is presented. The beam is assumed to be of linearly elastic, homogeneous, isotropic material and has a uniform rectangular cross-section. In this theory, the beam axial displacement and beam transverse displacement consist of bending components and shearing components. The assumed displacement field of this theory is such that, bending components do not take part in the cross-sectional shearing force, and shearing components do not take part in the cross-sectional bending moment. This theory utilizes linear strain-displacement relations. The displacement functions give rise to the beam transverse shear strain (and hence to the beam transverse shear stress) which varies quadratically through the beam thickness and maintains transverse shear stress-free beam surface conditions. Hence the shear correction factor is not required. Hamilton's principle is utilized to derive governing differential equations and variationally consistent boundary conditions. This theory involves only two governing differential equations of fourth-order. These governing equations are only inertially coupled for the case of dynamics and are decoupled for the case of statics. This theory is simple and has a strong resemblance with the Bernoulli-Euler beam theory. To demonstrate the efficacy of the present theory, illustrative examples pertain to the static bending and free vibrations of shear deformable isotropic rectangular beams are presented.

## کلمات کلیدی:

Refined beam theory, Two variable, Shear deformation theory

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