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A BEM Solution to Transverse Shear Loading of Beams

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In this paper a boundary element method is developed for the evaluation of the transverse shear stresses in beams of arbitrary simply or multiply connected constant cross section subjected in transverse shear loading. The shear loading is applied at the shear center of the cross section, avoiding in this way the induction of a twisting moment. Two boundary value problems that take into account the effect of Poisson's ratio are formulated with respect to harmonic functions and solved employing a pure BEM approach. The evaluation of the transverse shear stresses is accomplished by direct differentiation of these harmonic functions, while both the coordinates of the shear center and the shear deformation coefficients are obtained from these functions using only boundary integration. Numerical examples with great practical interest are worked out to illustrate the efficiency, the accuracy and the range of applications of the developed method.

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