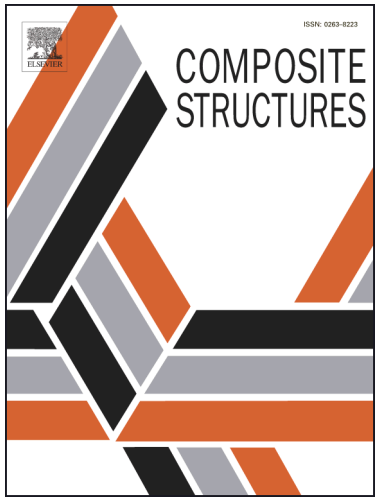

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Analytical model for flexural response of two-layered composite beams with interfacial shear slip using a higher order beam theory

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ABSTRACT

An exact analytical model based on a higher-order beam theory (HBT) is developed for an accurate prediction of the flexural response of two layered composite beams with partial shear interactions. This is achieved by taking a third order variation of the longitudinal displacement over the beam depth for the two layers separately. The deformable shear connectors joining the two different material layers are modelled as distributed shear springs along the beam length at their interface. The principle of virtual work is used to derive the governing equations which are solved analytically using a Navier type solution technique. To assess the performance of the proposed model, numerical examples of composite beams are solved using the model. The results predicted by the model are compared with published results and the numerical results produced by a one dimensional finite element model based on HBT as well as a detailed two-dimensional finite element modelling of composite beams.

Keywords: Composite beams; Partial shear interaction; Higher order beam theory; analytical solution; Flexural response

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