

Crack Propagation Effect at the Interface of a Composite Beam

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Abstract : In this research work, crack propagation at the interface of a composite beam is considered. The behavior of composite beams (CB) depends upon a law based on relationship between tangential or normal efforts with inelastic propagation. Throughout this study, composite beams are classified like composite beams with partial connection or sandwich beams of three layers. These structural systems are controlled by the same nature of differential equations regarding their behavior in the plane, as well as out-of-plane. Multi-layer elements with partial connection are typically met in the field of timber construction where the elements are assembled by joining. The formalism of the behavior in the plane and out-of-plane of these composite beams is obtained and their results concerning the engineering aspect or simple of interpretation are proposed for the case of composite beams made up of rectangular section and simply supported section. An apparent analytical peculiarity or paradox in the bending behavior of elastic-composite beams with interlayer slip, sandwich beam or other similar problems subjected to boundary moments exists. For a fully composite beam subjected to end moments, the partial composite model will render a non-vanishing uniform value for the normal force in the individual subelement. Obtained results are similar to those for the case of vibrations in the plane as well for the composite beams as for the sandwich beams where eigen-frequencies increase with related rigidity.

Keywords : composite beam, behaviour, interface, deflection, propagation

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