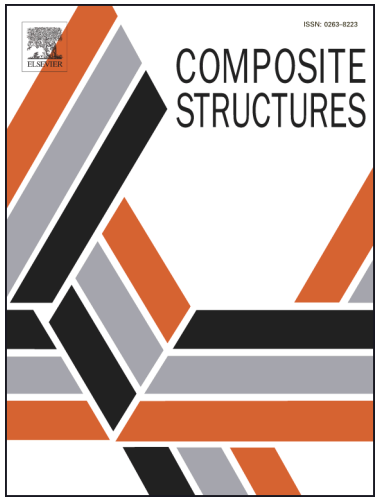


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# Sandwich panels under interfacial debonding mechanisms

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**ABSTRACT:** The paper presents a nonlinear approach to investigate the behavior of composite sandwich structures with transversely compressible core, under static and dynamic loading conditions. The proposed model, formulated in the 2D framework, incorporates moving mesh cohesive modeling, crack initiation and nucleation at core/skin interfaces. Interface elements are used to predict debonding mechanisms, whereas shear deformable beams and two-dimensional plane stress elements identify skin and core behavior, respectively. In this framework, interfacial crack onset, layer kinematic and debonding propagation effects are correctly simulated. The moving mesh technique, combined with a multilayer formulation, ensures a reduction of the computational costs, required to predict crack onset and progressive evolution of debonding phenomena. Cohesive models for sandwich core/skin interfaces are calibrated by means of comparisons with numerical and experimental data with respect mode I and mode II configurations. Moreover, a parametric study to address the influence of the loading rate and sandwich characteristics on both static and dynamic frameworks is proposed.

Keywords: sandwich structures, debonding phenomena, moving mesh technique, dynamic fracture mechanics.

**Nomenclature**

| | |
|---|---|
| $a$ | initial crack length |
| $b$ | length of the internal discontinuities |
| $B$ | width of the specimen |
| $g_f^k$ | crack growth function |
| $G_I$ | energy release rate mode I |
| $G_{II}$ | energy release rate mode II |
| $G_{IC}$ | critical strain energy release rate mode I |
| $G_{IIC}$ | critical strain energy release rate mode II |
| $g_f^k$ | crack growth function |
| $G_C$ | per unit area work of separation |
| $L$ | length of the specimen |
| $T^s$ | thickness of the skin |
| $T^c$ | thickness of the core |
| $v_s^c$ | shear wave speed of the core |
| $2\overline{\Delta}$ | internal discontinuity |
| $\Delta_0$ | characteristic length parameter of the work of separation |
| $\Omega^L$ | process zone on the left of the internal discontinuity |
| $\Omega^R$ | process zone on the right of the internal discontinuity |
| $\Omega_c$ | core domain |
| $\Omega_s$ | skin domain |