The influence of: specimen geometry, elasticity properties ratio and boundary conditions on purity of Mode I during interfacial crack growth in sandwich panels

***Daniel Pietras[1], †Tomasz Sadowski[1], Vyacheslav Burlayenko[1]**

[1]Department of Solid Mechanics, Lublin University of Technology

*Presenting author: d.pietras@pollub.pl

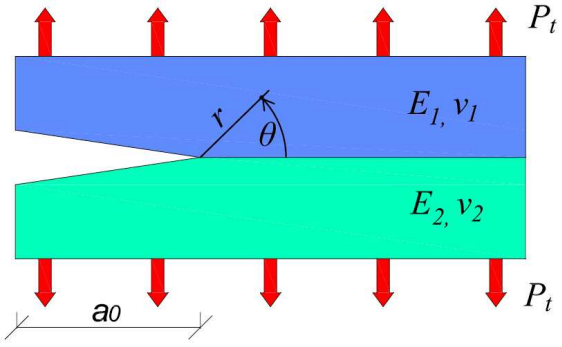
†Corresponding author: sadowski.t@gmail.com

Abstract

Sandwich panels consist of two thin metal or woven laminates and thick low density core are popular in many branches of engineering, like ship building and aerospace. Construction elements made of sandwich composites usually work in complex state of loading and are exposed to debonding of the skin from the core.

In the past decades different methods were developed for prediction of the sandwich structures elastic response to applied loading, failure and post failure behaviour in macro-scale in which the internal structure of composite is omitted. Nowadays, the mezo-scale approach allows for description of the sandwich panels including internal structure of composite constituents having strong differences in the elastic properties. The current knowledge about modelling of the sandwich panels is not enough and still needs improvements.

The aim of this paper is creation of the new numerical model for delamination growth and assessment of the fracture toughness K_{Ic} in Mode I of loadings (opening) for an interfacial crack between skin and core of the sandwich panel In particular, the parametric study using virtual tests in ABAQUS finite element method was performed. The influence of: (1) thickness proportions between the skin and core, (2) equivalent modulus elasticity ratio between skin and core and (3) boundary conditions for the single or double cantilever beams on value of stress intensity factor K_{II} (Mode II - shearing) was included in the numerical model.



Keywords: Sandwich, Fracture toughness, finite element analyses, delamination, single cantilever beam, double cantilever beam

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