

## Accepted Manuscript

A parametric study assessing performance of eXtended Finite Element Method in application to the cracking process in cross-ply composite laminates

Nikolay A. Petrov, Larissa Gorbatikh, Stepan V. Lomov

PII: S0263-8223(17)32196-7  
DOI: <https://doi.org/10.1016/j.compstruct.2017.12.014>  
Reference: COST 9171

To appear in: *Composite Structures*

Received Date: 17 July 2017  
Revised Date: 15 November 2017  
Accepted Date: 11 December 2017



Please cite this article as: Petrov, N.A., Gorbatikh, L., Lomov, S.V., A parametric study assessing performance of eXtended Finite Element Method in application to the cracking process in cross-ply composite laminates, *Composite Structures* (2017), doi: <https://doi.org/10.1016/j.compstruct.2017.12.014>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

**A parametric study assessing performance of eXtended Finite Element Method in application to the cracking process in cross-ply composite laminates**

Nikolay A. Petrov, Larissa. Gorbatikh, Stepan V. Lomov

*[Nikolay.Petrov@kuleuven.be](mailto:Nikolay.Petrov@kuleuven.be), [Larissa.Gorbatikh@kuleuven.be](mailto:Larissa.Gorbatikh@kuleuven.be), [Stepan.Lomov@kuleuven.be](mailto:Stepan.Lomov@kuleuven.be)*

*Department of Materials Engineering, KU Leuven, Kasteelpark Arenberg 44, B-3001, Leuven, Belgium*

*Web Page: <http://www.composites-kuleuven.be>*

*Center for Design, Manufacturing and Materials, Skolkovo Institute of Science and Technology,*

*Nobel Street, Skolkovo Innovation Center, 143026 Moscow, Russia*

*Web Page: <http://www.skoltech.ru/en>*

**Abstract**

The eXtended Finite Element Method (XFEM) allows modelling of the onset and propagation of multiple cracks in a material without prior assumption on their positions. In the current work, the method is examined for its capability to predict matrix cracking in cross-ply composite laminates under quasi-static tensile loading – a phenomenon that is well understood in the field. The study is performed using commercially available ABAQUS tools and focuses on the effect of numerical and physical parameters. The propagation of transverse cracks and delaminations is described by cohesive laws. XFEM predicts physically sound evolution of crack densities in function of the applied load if input data, such as the transverse strength (including statistical parameters of its distribution) and critical energy release rate characteristics in the cohesive laws, are correctly prescribed. These input parameters are difficult to determine experimentally, and their choice may be controversial. The paper investigates the influence of these parameters on the crack development history and discusses issues in their choice.

Download English Version:

<https://daneshyari.com/en/article/6704372>

Download Persian Version:

<https://daneshyari.com/article/6704372>

[Daneshyari.com](https://daneshyari.com)