Accepted Manuscript

X-Ray Micro-computed-tomography Characterization of Cracks Induced by Thermal Cycling in Non-crimp 3D Orthogonal Woven Composite Materials with Porosity

Marco Gigliotti, Yannick Pannier, Raquel Antoranz Gonzalez, Marie-Christine Lafarie-Frenot, Stepan V. Lomov

PII: S1359-835X(18)30205-7
DOI: https://doi.org/10.1016/j.compositesa.2018.05.020
Reference: JCOMA 5045

To appear in: *Composites: Part A*

Received Date: 15 January 2018
Revised Date: 29 April 2018
Accepted Date: 19 May 2018

Please cite this article as: Gigliotti, M., Pannier, Y., Gonzalez, R.A., Lafarie-Frenot, M-C., Lomov, S.V., X-Ray Micro-computed-tomography Characterization of Cracks Induced by Thermal Cycling in Non-crimp 3D Orthogonal Woven Composite Materials with Porosity, *Composites: Part A* (2018), doi: https://doi.org/10.1016/j.compositesa.2018.05.020

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.

ACCEPTED MANUSCRIPT

X-Ray Micro-computed-tomography Characterization of Cracks Induced by Thermal Cycling in Non-crimp 3D Orthogonal Woven Composite Materials with Porosity

Marco Gigliotti[1,*], Yannick Pannier[1], Raquel Antoranz Gonzalez[1],
Marie-Christine Lafarie-Frenot[1], Stepan V. Lomov[2]

[1]Institut PPRIME, University of Poitiers, ISAE-ENSMA, CNRS 3346
1, avenue Clément ADER, 86960 – Chasseneuil Futuroscope, FRANCE

[2]Department of Materials Engineering, KU Leuven
Kasteelpark Arenberg 44 bus 2450, 3001 Leuven, BELGIUM

*corresponding author, email: marco.gigliotti@ensma.fr

Abstract

This paper focuses on an experimental study of the thermal cycling behavior of a carbon fiber/epoxy matrix composite material reinforced with a non-crimp 3D orthogonal woven preform (3DNCOW). The aim is to characterize the damage mechanisms – i.e. matrix cracking - induced by thermal cycling thanks to X-ray micro-computed-tomography (µCT). Qualitative and quantitative descriptions of the morphology and the evolution of cracks with thermal cycling are carried out through the analysis of µCT scans of samples at different cycle numbers. In addition, since the specimens have a certain level of porosity due to the infusion process, a complete description of this defect is carried out, and its influence on the damage mechanisms induced by thermal cycling is analyzed.

Keywords: *A. Polymer-matrix composites (PMCs); B. Thermomechanical; B. Environmental degradation; D. CT analysis.*

1. Introduction

In the last few decades, new engineering materials such as composites with polymer and ceramic matrix have been gradually replacing conventional metal alloys. In particular, carbon fiber reinforced polymer composites (usually referred as CFRP) are currently widely used in structural applications due to their interesting characteristics: higher strength, light weight, non-corrosive properties, dimensional stability and potential to be incorporated into a performance-based-

Download English Version:

https://daneshyari.com/en/article/7889358

Download Persian Version:

https://daneshyari.com/article/7889358

Daneshyari.com