Accepted Manuscript

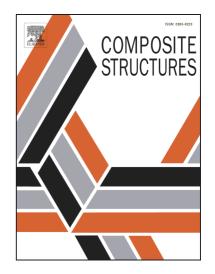
Accepted Date:

Impact damage of composite sandwich structures in arctic condition

Mohammed Elamin, Bing Li, K.T. Tan

PII:	S0263-8223(17)33611-5
DOI:	https://doi.org/10.1016/j.compstruct.2018.03.015
Reference:	COST 9462
To appear in:	Composite Structures
Received Date:	31 October 2017
Revised Date:	24 January 2018

7 March 2018



Please cite this article as: Elamin, M., Li, B., Tan, K.T., Impact damage of composite sandwich structures in arctic condition, *Composite Structures* (2018), doi: https://doi.org/10.1016/j.compstruct.2018.03.015

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

Impact damage of composite sandwich structures in arctic condition

Mohammed Elamin, Bing Li[†], K.T. Tan^{*}

Department of Mechanical Engineering, The University of Akron, Akron, Ohio, 44325-3903, USA Corresponding author Tel: +1-330-972-7184; Fax: +1-330-972-6027; Email address: [†]bingli@uakron.edu, ^{*}ktan@uakron.edu

Abstract

This study investigates the impact response and damage mechanisms of composite sandwich structures in arctic condition. Carbon fiber reinforced composite sandwich panels with polyvinyl chloride (PVC) foam core are subjected to low-velocity impact at extreme low temperatures, representative of the harsh arctic environmental condition. Force-time history curves evidently show that test temperature has a significant influence on the impact damage behavior. Specimens impacted at extreme low temperature (-70°C) exhibit less strength, and higher susceptibility to damage, resulting in severe penetration by the impactor. X-ray micro-computed tomography technique is employed to reveal multiple complex impact damage modes. Specifically, results from this work elucidate arctic temperature influence on detrimental failure mechanisms: large facesheet-core debonding, extensive composite facesheet delamination, significant core shearing and crushing, and severe facesheet fiber fracture. This work provides an important fundamental knowledge for future design of naval composite sandwich structures with enhanced impact performance at low temperature arctic condition.

Keywords: Sandwich structures; Damage tolerance; Impact behavior; Micro computed tomography

Download English Version:

https://daneshyari.com/en/article/6703804

Download Persian Version:

https://daneshyari.com/article/6703804

Daneshyari.com