### Accepted Manuscript

Numerical failure assessment of multi-bolt FRP composite joints with varying sizes and preloads of bolts

#### B. Mandal, A. Chakrabarti

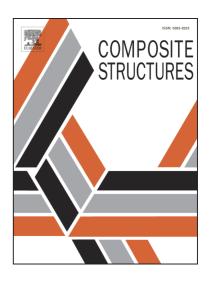
PII: S0263-8223(17)33405-0

DOI: https://doi.org/10.1016/j.compstruct.2017.12.048

Reference: COST 9205

To appear in: Composite Structures

Received Date: 17 October 2017
Revised Date: 1 December 2017
Accepted Date: 20 December 2017



Please cite this article as: Mandal, B., Chakrabarti, A., Numerical failure assessment of multi-bolt FRP composite joints with varying sizes and preloads of bolts, *Composite Structures* (2017), doi: https://doi.org/10.1016/j.compstruct.2017.12.048

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**

Numerical failure assessment of multi-bolt FRP composite joints with varying sizes and preloads of bolts

**B** Mandal <sup>1</sup>, A Chakrabarti <sup>2</sup>

<sup>1, 2</sup> Department of Civil Engineering, Indian Institute of Technology Roorkee, Roorkee 247667,

India

A three dimensional (3D) progressive damage model (PDM) is developed for the failure assessment of fibre reinforced plastic (FRP) composite bolted joints subjected to bolt preloads. Material constitutive equations and material damage model are defined in a user-subroutine UMAT which is integrated with the finite element (FE) software ABAQUS. Fibre and matrix failure in tension, compression or in shear along with delamination failure criteria are incorporated in the present numerical model. Load-displacement behavior, laminate surface strains, propagation of damage and failure of a double-lap multi-bolt composite joint have been studied and present results are validated with the results available in literature. Failure of double-lap multi-bolt FRP joints with different bolt diameters and bolt tightening torques have been investigated using the proposed progressive damage model.

**Keywords:** failure analysis; FRP composite; finite element analysis; progressive damage; ABAQUS user-subroutine.

<sup>&</sup>lt;sup>1</sup> Research Scholar, <u>bibekanandabesu@gmail.com</u>

<sup>&</sup>lt;sup>2</sup> Associate Professor, anupam1965@yahoo.co.uk

#### Download English Version:

# https://daneshyari.com/en/article/6704238

Download Persian Version:

https://daneshyari.com/article/6704238

<u>Daneshyari.com</u>