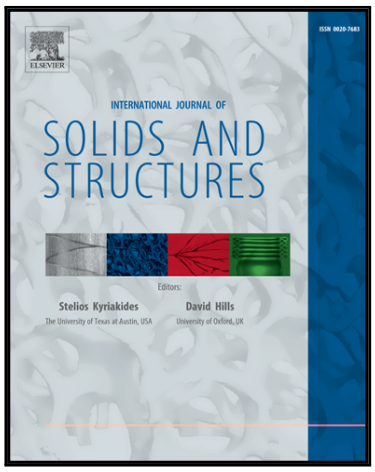

On a concept of directional damage gradient in transversely isotropic materials

B. Nedjar

PII: S0020-7683(16)30011-7
DOI: 10.1016/j.ijsolstr.2016.03.026
Reference: SAS 9114

To appear in: *International Journal of Solids and Structures*

Received date: 29 July 2015
Revised date: 30 January 2016
Accepted date: 25 March 2016

Please cite this article as: B. Nedjar, On a concept of directional damage gradient in transversely isotropic materials, *International Journal of Solids and Structures* (2016), doi: 10.1016/j.ijsolstr.2016.03.026

On a concept of directional damage gradient in transversely isotropic materials

B. Nedjar[a,*]

[a]*IMSIA, ENSTA ParisTech, CNRS, CEA, EDF, Université Paris-Saclay, 91762 Palaiseau, France*

Abstract

Of interest in this paper is the description of damage evolution in anisotropic materials where it is mainly observed that damage is in general strongly influenced by the anisotropy itself. More specifically, transversely isotropic materials such as unidirectional fibre-reinforced composites and sedimentary rocks are under focus. The approach we use is based on continuum damage mechanics where the damage gradient quantity is involved. In this work, this latter is oriented toward privileged directions where damage will most probably propagate. This task is accomplished by adopting the integrity-basis formulation where the directional damage gradient is embedded and, otherwise, allows for a neat decomposition of the material response into directional, transverse, and pure shear contributions. This offers an appealing framework where damage characterization can be easily formulated. Damage can be chosen to be governed by transverse strains, by in-plane pure shear strains, or by both of them. One can then speak, respectively, of a mode-I, mode-II, or mixed I/II damage mechanisms if use is made of the terminology

*Corresponding author, phone: +33 1 69 31 98 15
Email address: boumediene.nedjar@ensta-paristech.fr (B. Nedjar)