

Accepted Manuscript

Effects of Tablet Waviness on the Mechanical Response of Architected Multi-layered Materials: Modeling and Experiment

Sina Askarinejad, Habibeh Ashouri Choshali, Christina Flavin, Nima Rahbar

PII: S0263-8223(18)30594-4

DOI: <https://doi.org/10.1016/j.compstruct.2018.04.047>

Reference: COST 9601

To appear in: *Composite Structures*



Please cite this article as: Askarinejad, S., Choshali, H.A., Flavin, C., Rahbar, N., Effects of Tablet Waviness on the Mechanical Response of Architected Multilayered Materials: Modeling and Experiment, *Composite Structures* (2018), doi: <https://doi.org/10.1016/j.compstruct.2018.04.047>

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.

Effects of Tablet Waviness on the Mechanical Response of Architected Multilayered Materials: Modeling and Experiment

Sina Askarinejad^a, Habibeh Ashouri Choshali^b, Christina Flavin^b, Nima Rahbar^{a,b,*}

^a*Department of Mechanical Engineering, Worcester Polytechnic Institute, Worcester, MA*

^b*Department of Civil and Environmental Engineering, Worcester Polytechnic Institute, Worcester, MA*

Abstract

The excellent mechanical properties that biological materials possess are greatly influenced by the geometrical properties of their small scale constituents. Nacre, also known as Mother of Pearl, is an organic-inorganic composite material that makes up the inner layer of seashells. Nacre is observed for its impressive combination of stiffness, strength, and toughness which can be attributed to its waviness and the layering pattern of the brick and mortar structure of ceramic and protein that allows nacre to exhibit great mechanical energy and dissipate it over a large volume. In this study, the effect of this waviness on a model architected multilayered material system is analyzed numerically and experimentally in order to understand its effects on the stiffness, strength, and toughness of nacre. 3-D printed composites with auxetic and nacreous structure were created and tested in tensile boundary conditions. Finite element analysis was used to study the stress distribu-

*Corresponding author

Email address: nrahbar@wpi.edu (Nima Rahbar)

Download English Version:

<https://daneshyari.com/en/article/6703386>

Download Persian Version:

<https://daneshyari.com/article/6703386>

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