

Accepted Manuscript

Multi-physical field guided wave simulation for circular concrete-filled steel tubes coupled with piezoelectric patches considering debonding defects

Bin Xu , Hongbing Chen , Y.-L. Mo , Xuemin Chen

PII: S0020-7683(17)30253-6
DOI: [10.1016/j.ijsolstr.2017.05.040](https://doi.org/10.1016/j.ijsolstr.2017.05.040)
Reference: SAS 9602



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

Received date: 4 February 2016
Revised date: 24 May 2017
Accepted date: 29 May 2017

Please cite this article as: Bin Xu , Hongbing Chen , Y.-L. Mo , Xuemin Chen , Multi-physical field guided wave simulation for circular concrete-filled steel tubes coupled with piezoelectric patches considering debonding defects , *International Journal of Solids and Structures* (2017), doi: [10.1016/j.ijsolstr.2017.05.040](https://doi.org/10.1016/j.ijsolstr.2017.05.040)

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.

Multi-physical field guided wave simulation for circular concrete-filled steel tubes coupled with piezoelectric patches considering debonding defects

Bin Xu^{1,2,*}, Hongbing Chen³, Y.-L. Mo⁴, Xuemin Chen⁵

¹ College of Civil Engineering, Huaqiao University, 668 Jimei Avenue, Xiamen, Fujian 361021, P. R. China

² Key Laboratory for Structural Engineering and Disaster Prevention of Fujian Province (Huaqiao University), 668 Jimei Avenue, Xiamen, Fujian 361021, P. R. China

³ College of Civil Engineering, Hunan University, Changsha, Hunan 410082, P. R. China

⁴ Department of Civil and Environmental Engineering, University of Houston, Houston, TX 77204-4006, USA

⁵ Department of Engineering, Texas Southern University, Houston, TX, 77004, USA

*Corresponding author: binxu@hqu.edu.cn

Abstract: The active interface debonding detection for concrete-filled steel tubes (CFSTs) using Piezoelectric Lead Zirconate Titanate (PZT) patches has been proposed and experimentally studied in recent years. In order to further investigate the guided wave propagation and the response of embedded PZT sensor, transient dynamic analysis on multi-physical field coupling models composed of surface-mounted PZT actuator, embedded PZT sensor and a circular CFST specimen considering the coupling effect between the PZT patches and CFST member and the influence of interface debonding defects is carried out numerically. The guided wave propagation within the CFST-PZT coupling system without and with interfacial debonding defects under single period impulse signal is simulated and compared. The voltage response time history of the embedded PZT sensor in coupling models under both sinusoidal and sweep frequency sinusoidal excitations are simulated as an alternative solver. Numerical results demonstrate that interface debonding leads to changes in guided wave propagation path, traveling time and the PZT sensor response. The sensitivity of a quantitative evaluation index called as the normalized wavelet packet energy of the output voltage of embedded PZT sensor to the initiation of interface debonding defect and its length and depth is illustrated.

Download English Version:

<https://daneshyari.com/en/article/4922330>

Download Persian Version:

<https://daneshyari.com/article/4922330>

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