

Accepted Manuscript

Uncertain natural frequency analysis of composite plates including effect of noise – A polynomial neural network approach

S. Dey, S. Naskar, T. Mukhopadhyay, U. Gohs, A. Spickenheuer, L. Bittrich, S. Sriramula, S. Adhikari, G. Heinrich

PII: S0263-8223(16)30027-7

DOI: <http://dx.doi.org/10.1016/j.compstruct.2016.02.007>

Reference: COST 7219

To appear in: *Composite Structures*



Please cite this article as: Dey, S., Naskar, S., Mukhopadhyay, T., Gohs, U., Spickenheuer, A., Bittrich, L., Sriramula, S., Adhikari, S., Heinrich, G., Uncertain natural frequency analysis of composite plates including effect of noise – A polynomial neural network approach, *Composite Structures* (2016), doi: <http://dx.doi.org/10.1016/j.compstruct.2016.02.007>

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.

Uncertain natural frequency analysis of composite plates including effect of noise – A polynomial neural network approach

S. Dey^{1,*}, S. Naskar², T. Mukhopadhyay^{3*}, U. Gohs¹, A. Spickenheuer¹, L. Bittrich¹,
S. Sriramula², S. Adhikari³, G. Heinrich^{1,4}

¹ Leibniz-Institut für Polymerforschung Dresden e.V. (IPF), Germany

² School of Engineering, University of Aberdeen, United Kingdom

³ College of Engineering, Swansea University, United Kingdom

⁴ Technische Universität Dresden, Germany

* Corresponding author's e-mail: infosudip@gmail.com

Abstract

This paper presents the quantification of uncertain natural frequency for laminated composite plates by using a novel surrogate model. A group method of data handling in conjunction to polynomial neural network (PNN) is employed as surrogate for numerical model and is trained by using Latin hypercube sampling. Subsequently the effect of noise on a PNN based uncertainty quantification algorithm is explored in this study. The convergence of the proposed algorithm for stochastic natural frequency analysis of composite plates is verified and validated with original finite element method (FEM). Both individual and combined variation of stochastic input parameters are considered to address the influence on the output of interest. The sample size and computational cost are reduced by employing the present approach compared to direct Monte Carlo simulation (MCS).

Keywords. uncertainty quantification; polynomial neural network; stochastic natural frequency; Latin hypercube; composite plate

Download English Version:

<https://daneshyari.com/en/article/6705758>

Download Persian Version:

<https://daneshyari.com/article/6705758>

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