

TITLE: Uncertainty quantification of a 1-D beam deflection due to stochastic parameters

REFERENCE: El-Beltagy, M. A., **O. H. Galal**, and M. I. Wafa. "Uncertainty Quantification of a 1-D Beam Deflection Due to Stochastic Parameters." AIP Conference Proceedings. Vol. 1389. No. 1. American Institute of Physics, 2011, doi:10.1063/1.3637007.

NUMBER OF AUTHORS: 3

PUBLISHER: AMER. INST. PHYSICS

YEAR OF PUBLICATION: September, 2011

VENUE: USA

REFERREING: International Conference

IMPACT FACTOR: 0.3 - Scopus (2011) (Q4)

ABSTRACT:

In this paper the uncertainty quantification of a 1-D beam deflection subjected to stochastic excitation, stochastic material property and mixed stochastic parameters is considered. A stochastic finite-volume solver based on the polynomial chaos expansion is developed and used to quantify the deflection in all cases. Monte Carlo simulations accelerated by a RBF neural network were used to verify the results. The RBF neural-network is trained with the dominant eigenpairs of the covariance kernel to reduce the dimensionality of the neural network. The mean and variance of the beam maximum deflection is quantified, compared and verified in all cases.