

Review of paper:” Metamodelling of Dynamic Nonlinear Structural Systems through Polynomial Chaos NARX Models” by Spiridonakos and Chatzi

This paper presents a multiple step approach to develop metamodels of complex nonlinear systems to provide accurate simulation of the system’s dynamic response. These metamodels are based on NARX models with random parameters that are expanded into a PC basis.

The paper is well-written with a good balance between theoretical development and numerical analyses. It is recommended for publication.

The authors are encouraged to address the following comments:

- 1) There are few typos in the text that should be corrected (“which which”, where instead of were, etc.
- 2) In section 2, the authors describe the uncertainties in the parameters and in the input signals into a vector ξ with a known joint probability density function. How do they know such a pdf? Are these two independent sets of random variables?
- 3) I think it would be beneficial to add one paragraph describing the difference between simulation error method and prediction error method.
- 4) In the numerical examples, the authors seem to be dealing only with scalar measurements (only one response for the SDOF and the velocity of node 7). What are the implications, in terms of numerical computation and effort, when more measurements are considered?
- 5) The authors should comment on the possibility of having multiple (equally possible) solutions due to the fact that there are not as many measurements as the number of degrees of freedom of the structure. Could the metamodel, being of reduced order, switch from one solution to another?

The paper should be accepted for publication.