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Prof. B.H.V. Topping

Editor in Chief

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**Re:** Revised version of manuscript CAS-D-14-00426 “Metamodeling of Dynamic Nonlinear Structural Systems through Polynomial Chaos NARX Models” by M.D. Spiridonakos and E.N. Chatzi.

RESPONSE TO REVIEWER #1

1. *“*The authors presented a paper last September on metamodels at the Civil-Comp Conference but the authors fail to cite this paper and explain the relationship between this paper and the one presented at the Civil-Comp Conference.  The review of the paper should be stopped and the author asked to revise their paper and resubmit a new paper*.”*

Response: We apologize for not clarifying this point of confusion in our earlier submission. We also would like to thank the reviewer for providing us with an opportunity to cite our earlier work. Indeed, the general problem that is dealt with in both of the aforementioned papers is the metamodeling of the dynamic response of large numerical models which are computationally costly to run. However, although in both these cases the unifying element lies in the fact that the uncertainty quantification component is achieved by means of a polynomial chaos expansion, the paper presented last year in the Civil-Comp conference was based on a non-parametric representation employing the discrete wavelet transform, while the proposed method in CAS-D-14-00426 studyof relies on the use of parametric NARX models. The advantages of using the latter approach are: i) they are more appropriate for nonlinear problems while DWT could be more efficient for nonstationary ones, ii) the inclusion of the eXogenous term permits the incorporation of input excitation giving increased accuracy, iii) improved physical insight into the dynamics of the modeled system and the mechanisms of uncertainty propagation, and iv) the freedom in selection of regression terms adjusted to the specific problem at hand (specifically non-polynomial terms like those based on absolute function that are better suited for the description of material nonlinearities).

The aforementioned differences have been pointed out in the revised manuscript (5th paragraph of the Introduction) while the Civil-Comp conference paper has also been cited therein. Also some more recent citations in metamodeling have been added in the manuscript. The paragraph now reads:

“In early work, the authors have formulated a metamodelling approach where the uncertainty propagation was captured by a PC expansion, however in that case the forward model comprised a nonparametric representation based on discrete wavelet transform decomposition [23]. The target therein lied in the adequate representation of the response of nonstationary systems. To the contrary, the method introduced herein focuses on the specific problem of material nonlinearity with the inclusion of appropriate non-polynomial terms. Additionally, the NARX parametric approach comes with a physical connotation with respect to the problem under study rendering this metamodeling approach particularly effective for this class of problems. An added innovation of the present study is the parametrization of the input which is achieved by the eXogenous part of the NARX representation.”