

Some notes on the article [PUL 11]“Modelling and simulation of autonomous oscillators with random parameters”

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Abstract: A random process corresponding to an autonomous oscillator with random parameters depends on the choice of a phase condition is considered. An appropriate quantification of uncertainties is achieved by a random process with a minimal total variance. The authors has shown a necessary condition for an optimal solution using the calculus of variations. A corresponding numerical method has been constructed based on expansions of the random process as well as the random period in the generalised polynomial chaos. A Galerkin projection yields a larger coupled system to determine an approximation of the random process and the random period. The authors resolved the stochastic model for two test examples, where a minimal total variance is achieved. Elementary phase conditions may result in suboptimal random process. Some phase conditions yield a larger variance as shown in the numerical simulations.

Key words and phrases: Ordinary differential equation; Differential algebraic equation; Uncertainly quantification; Polynomial chaos; Calculus of variations.

Subject Classification :

1 what i have learned....

1. *expert?* it seems that i'm not expert in the subject of the article and i would like just to learn some things ...
2. *area:* mathematical modelling often yields systems of ordinary differential equations (ODEs) or differential algebraic equations (DAEs).
3. *literature:* the article under consideration is a continuation of previous works [PUL 08, PUL 09, PUL 09, PUL 09] for the same author.

References

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- [PUL 08] ROLAND PULCH: Polynomial chaos for analysing periodic process of differential algebraic equations with random parameters. *Proceedings of Appl. Math. Mech.*, **8**, 10069–10072, 2008.
- [PUL 09] ROLAND PULCH: Polynomial chaos expansions for analysing oscillators with uncertainties. *in 1. Troch, F. Breitenecker (Eds). Proceedings of MATHMOD 09 Vienna*, 2009.
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