Polynomial Chaos Approach Based Uncertainty Quantification and Sensitivity Analysis of Chemical Process

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Uncertainties are important to do sensitivity analysis, to get a reasonable confidence bound on the model predictions. In this work, we proposed a generalized polynomial chaos based approach for studying uncertainty quantification and sensitivity analysis of chemical processes. Essentially, gPC method approximates the dependence of simulation model output on model parameters by expansion in an orthogonal polynomial basis and all statistical information of interested output can be obtained from the surrogate gPC model by the interface between Matlab and HYSYS. The proposed methodology is compared with traditional Monte Carlo (MC), Quasi Monte Carlo sampling based approaches to illustrate its advantages in terms of computational efficiency as well as accuracy. This study was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2015R1D1A3A01015621) and by Priority Research Centers Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2014R1A6A1031189).