Sensitivity analysis on models with correlated inputs : application to chemical processes

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Sensitivity analysis investigates the effects of varying a model input on the outputs and ascertains how much a model depends on each or some of its inputs. These effects are studied through measures of importance called sensitivity indices. When the input factors are independent, two techniques, Sobol and FAST, are the most popular methods for estimating these indices. However when the input factors are correlated these techniques can no longer be used.
We propose here a new estimation methodology to compute first-order sensitivity indices when the input factors are correlated. It is based on local polynomial techniques for conditional moments. Our easy black-box procedure is compared to other existing methods and we illustrate its efficiency on a real case of a kinetic model with correlated parameters we investigated at Institut Francais du Petrole.