

# Uncertainty quantification for complex flows: a brief state of the art on spectral methods and examples

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We are interested in the resolution of uncertain systems of conservation laws. Uncertainty is modeled thanks to probability theory; i.e. random variables, and we consequently aim at solving a stochastic PDE. A simple example putting at play the uncertain Euler system will be presented and considered all along the presentation to illustrate the expectations of such modeling and the difficulties arising. To circumvent some of them, in particular, we will focus on the construction of relevant reduced models with respect to the uncertain regime. They will be closely related to kinetic theory and the construction of Grad's moment problem,  $S_n$ ,  $P_n$  or even  $M_n$  models for gas dynamics except the decomposition is not carried out with respect to an angular distribution but rather with respect to the uncertain parameter.