

**TITLE: Upwind Finite-Volume Solution of Stochastic Burgers' Equation**

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**ABSTRACT:**

In this paper, a stochastic finite-volume solver based on polynomial chaos expansion is developed. The upwind scheme is used to avoid the numerical instabilities. The Burgers' equation subjected to deterministic boundary conditions and random viscosity is solved. The solution uncertainty is quantified for different values of viscosity. Monte-Carlo simulations are used to validate and compare the developed solver. The mean, standard deviation and the probability distribution function (p.d.f) of the stochastic Burgers' solution is quantified and the effect of some parameters is investigated. The large sparse linear system resulting from the stochastic solver is solved in parallel to enhance the performance. Also, Monte-Carlo simulations are done in parallel and the execution times are compared in both cases.