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(57) Abstract :
Abstract Despite its widespread use, the Monte Carlo simulation can be prohibitively expensive to compute for deterministic models and can experience slow convergence when used to determine the impact of uncertainty on the way out of nonlinear equations. This motivated us to create data-driven low-fidelity simulations for MFMC approaches to analysis methods of nonlinear partial differential equations. Finite-element discretization or the Fourier transform is first employed to convert the nonlinear differential equations interested in ODEs. Furthermore, appropriate nonlinear low-fidelity modelling in ODEs systems is built by coupling the reduced dimension model with the DEIM. Ultimately, the output figures from the high-fidelity besides low-fidelity modelling are combined using the MFMC approach to provide the best possible approximation of the statistics. As demonstrated by experimental findings for the nonlinear Schrodinger solution in addition to the Burgers' solution, the MFMC approach herein study, grounded on the data-driven low-fidelity model, may significantly enhance the computation efficiency compared to the usual Monte Carlo method.

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