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Solving SPDEs by Least Squares Method

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Abstract : We present in this paper a useful strategy to solve stochastic partial differential equations (SPDEs) involving stochastic coefficients. Using the Wick-product of higher order and the Wiener-Itˆo chaos expansion, the SPDEs is reformulated as a large system of deterministic partial differential equations. To reduce the computational complexity of this system, we shall use a decomposition-coordination method. To obtain the chaos coefficients in the corresponding deterministic equations, we use a least square formulation. Once this approximation is performed, the statistics of the numerical solution can be easily evaluated.

Keywords : least squares, wick product, SPDEs, finite element, wiener chaos expansion, gradient method
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