PROBABILISTIC FINITE ELEMENT ANALYSIS OF NON LINEAR SYSTEMS: APPLICATION TO TUNNEL EXCAVATION

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Stochastic problems for non linear systems are more and more of interest because it is an important issue to quantify uncertainties when parameters (loading, material properties, etc.) are modelized by random variables or correlated random fields [1, 2]. Despite a slow convergence, Monte Carlo methods are the most often used to solve these problems thanks to its easy implementation (non intrusive computation). Probabilistic Finite Element methods like Galerkin formulations [3, 4], which produce a coupled system, are often viewed as intrusive. Here, we want to show that is possible to compute them in a non intrusive way and with the same accuracy as Monte Carlo methods which are considered as a reference. For the sake of example we will solve a non linear problem applied in geomechanics (tunnel excavation) with uncertain parameters.

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