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Reduced model of macro-scale stochastic plasticity identification by Bayesian inference

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ABSTRACT

In this paper we deal with constructing probability-based scale bridging when passing the detailed information of the meso-scale plasticity model for localized failure of concrete towards the chosen reduced model at macro-scale. This is accomplished by using Bayesian inference providing the probability distribution of macro-scale model parameters expressed as random variables or fields in order to compensate for model reduction. The proposed procedure is illustrated in detail for concrete mesoscale model presented in (see [1]), both for simple elastic response and plastic response with hardening in fracture process zone, as well as for softening response in localized failure phase. The latter implies that the classical homogenization procedure no longer applies, and should be replaced by macro-scale reduced model defined with respect to the quantity of interest, not necessarily the same for each particular response phase. The complete set of results for parameters identification are combined together at the level of a solid finite element with embedded discontinuity, granting it very powerful predictive properties.

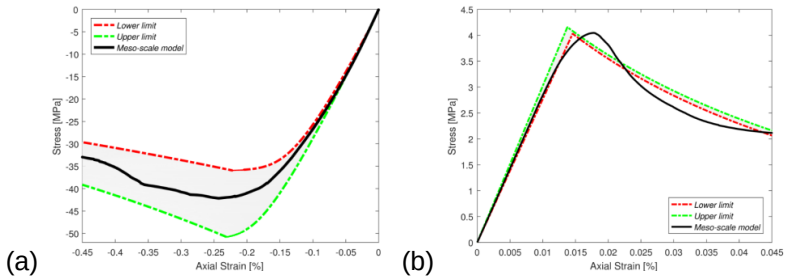

Fig. 1 Global response compute with 95% confidence interval of posterior

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distribution for: (a) uniaxial compression test; (b) uniaxial tension test.

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