

# Coarse approximation of highly oscillatory random elliptic problems

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## ABSTRACT

We consider an elliptic problem (e.g. a thermal problem, or an elasticity problem) with highly oscillatory, possibly random coefficients. We show how to approximate it using a problem of the same type, but with constant and deterministic coefficients, that are defined by an optimization procedure. The functional which is optimized couples in some appropriate way the reference highly oscillatory problem with the constant coefficient problem. The approach is robust to the fact that the information on the oscillatory coefficients in the equation can be incomplete. In the limit of infinitely small oscillations of the coefficients, we illustrate the links between this approach and the classical theory of homogenization, based on solving corrector problems on large RVEs. Comprehensive numerical tests and comparisons will be discussed, that show the practical interest of the approach.

This is joint work with Claude Le Bris (Ecole des Ponts and Inria) and Simon Lemaire (now at Inria).

## REFERENCES

- [1] Le Bris, C., Legoll, F. and Lemaire, S. On the best constant matrix approximating an oscillatory matrix-valued coefficient in divergence-form operators. *Control, Optimisation and Calculus of Variations*, in press.