# Variational Multiscale Stabilization and the Exponential Decay of Fine-scale Correctors

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This lecture addresses the variational multiscale stabilization of standard finite element methods for partial differential equations that exhibit multiscale features. The stabilization is of Petrov-Galerkin type with a standard finite element trial space and a problem-dependent test space based on pre-computed fine-scale correctors. The exponential decay of these correctors and their localisation to local cell problems is rigorously justified. The stabilization technique eliminates scale-dependent pre-asymptotic effects as they appear in standard finite element approximations of highly oscillatory problems, e.g., the poor $L^2$ approximation in homogenization problems and the pollution effect in high-frequency acoustic scattering.

References:

[1] D. Peterseim, Variational Multiscale Stabilization and the Exponential Decay of Fine-scale Correctors, arXiv e-print 1505.07622, 2015. http://arxiv.org/abs/1505.07611

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