A Residual Error Estimator for MSFEM in 2D

Markus Schöbinger, Karl Hollaus and Joachim Schöberl
Institute for Analysis and Scientific Computing, Wiedner Hauptstraße 8-10, A-1040 Vienna

Email: *markus.schoebinger@tuwien.ac.at*

An a posteriori error estimator for a 2D multiscale method for elliptic problems on layered domains is developed. The estimator is based on flux reconstruction techniques, also known as the hypercircle method or equilibration. The main idea is to use classical reconstruction techniques for the mean value function and adding terms corresponding to the fine structure afterward. Finding efficient correctors which give an accurate result but are still cheap to compute is a quite involved process and is demonstrated for an elliptic model equation.
The second challenge is the efficient evaluation of the error estimator, which requires integration over the fine structured domain. In order to overcome this problem, a modification of approximate integration techniques dating back to Filon is developed and implemented.

Keywords: Error Estimator, Multiscale, Flux Reconstruction