Convergence analysis of a multiscale hybrid-mixed method

Henrique Versieux[1], Frederic Valentin[2], Diogo Paredes[3]

[1] Universidade Federal de Minas Gerais

[2] Laboratorio Nacional de Computaça o científica

[3] Pontificia Univeridad Católica de Valparaíso

In this work we study the convergence of the Multiscale Hybrid-Mixed finite element method for second order elliptic problems with rough periodic coefficients.

We analyze the convergence of the method with respect to the mesh size h and the number of degrees of freedom on each edge (associated with an subpartition of the each edge with size $\hat{h}$). In particular, we establish that the discretization error for both the primal variable in the broken H^1 seminorm and for the dual variable in the $H(\mathrm{div};\cdot)$ norm is $O(\hat{h}+\left(\frac{\epsilon}{h}\right)^{\delta})$, where $0<\delta\leq 1/2$ (depending on regularity). Such result rely on sharpened asymptotic expansion error estimates for the elliptic models with prescribed Dirichlet, Neumann or mixed boundary conditions.

References

[1] C Harder; D Paredes; F. Valentin , *A family of multiscale hybrid-mixed finite element methods for the Darcy equation with rough coefficients* , J. Comput. Phys.

[2] D Paredes; F Valentin; H Versieux , *On the robustness of multiscale hybrid-mixed methods*, Math. Comp.