Author: T. A. Suslina

Title: Operator error estimates for homogenization of the elliptic Dirichlet problem in a bounded domain

Abstract. Let $\mathcal{O} \subset \mathbb{R}^d$ be a bounded domain of class $C^{1,1}$. In $L_2(\mathcal{O};\mathbb{C}^n)$, we study a matrix elliptic second order differential operator $A_{D,\varepsilon}$ with the Dirichlet boundary condition. Here $\varepsilon > 0$ is the small parameter; the coefficients of $A_{D,\varepsilon}$ are periodic and depend on $\mathbf{x}/\varepsilon$. It is proved that the resolvent $A_{D,\varepsilon}^{-1}$ converges to $(A_D^0)^{-1}$ in the L_2-operator norm as $\varepsilon \to 0$, where A_D^0 is the effective operator with constant coefficients and the Dirichlet boundary condition. A sharp order error estimate $\|A_{D,\varepsilon}^{-1} - (A_D^0)^{-1}\|_{L_2 \to L_2} \leq C\varepsilon$ is obtained. Also, we find approximation for $A_{D,\varepsilon}^{-1}$ in the $(L_2 \to H^1)$-operator norm with an error term $O(\varepsilon^{1/2})$. In this approximation, the first order corrector is taken into account.