Kolloquium Angewandte Mathematik
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der Bundeswehr
Universität München

Vortragsankündigung

Am **Dienstag, den 16.05.2017,** hält **um 15:30 Uhr**

Monika Weymuth
(Universität Zürich)

einen Gastvortrag über das Thema

Adaptive Local (AL) Basis for Elliptic Problems with L^∞-Coefficients

Der Vortrag findet im **Raum 1201** in **Gebäude 33** statt.

Vortragszusammenfassung

We define a generalized finite element method for the discretization of elliptic partial differential equations in heterogeneous media. In [1] a method has been introduced to set up an adaptive local finite element basis (AL basis) on a coarse mesh with mesh size H which, typically, does not resolve the matrix of the media while the textbook finite element convergence rates are preserved. This method requires $O(\log(\frac{1}{H})^{d+1})$ basis functions per mesh point where d denotes the spatial dimension of the computational domain. Since the continuous differential operator is involved in the construction, the method presented in [1] is only semidiscrete. In this talk we present a fully discrete version of the method, where the AL basis is constructed by solving finite-dimensional localized problems.
A key tool for the discretization of the differential operator is the theory developed in [2]. We will prove that the localized method converges linearly with respect to the energy norm. Important tools for the error analysis are Caccioppoli's inequality and the construction of a local cutoff function in an annular domain. This construction is based on some new results concerning the $W^{1,p}$-regularity of the Poisson problem with complicated coefficients. Bounds for the gradient of the solution in the L^p-norm are derived and it is shown that they only depend on the size of the jumps in the coefficients.

Literatur

[1] L. Grasedyck, I. Greff, and S. Sauter. The AL basis for the solution of elliptic problems in heterogeneous media. *Multiscale Model. Simul.*, 10(1):245–258, 2012.

[2] D. Peterseim and S. Sauter. Finite elements for elliptic problems with highly varying, nonperiodic diffusion matrix. *Multiscale Model. Simul.*, 10(3):665–695, 2012.

Alle Interessierten sind dazu herzlich eingeladen.