Invitation to the talk *Numerical Homogenization by Localized Orthogonal Decomposition* by Prof. Dr. Patrick Henning at the GAMM Student Chapter at TU Dortmund University

Place: MB I - R165 (hybrid)
           Zoom Link: Link
           Meeting ID: 969 1337 3785
           Passcode: maths

Date: Thursday, 1st February 2024
Time: 4:00pm (16:00)

Preliminary agenda

TOP 1: Seminar talk by **Prof. Dr. Patrick Henning** (see abstract below)

TOP 2: Discussion and Questions

Abstract

Numerical Homogenization by Localized Orthogonal Decomposition

Prof. Dr. Patrick Henning - Ruhr University Bochum

In this talk, we will discuss partial differential equations with multiscale coefficients, so-called multiscale problems, from the perspective of numerical analysis. In many applications, the considered multiscale coefficients appearing in a partial differential equation (PDE) are unstructured (highly heterogenous) and discontinuous, so that the unknown exact solution does not only admit a multiscale structure, but also very low regularity. We will briefly discuss why this causes problems for conventional finite element discretizations on coarse meshes and then turn towards an alternative discretization based on generalized finite elements with multiscale shape functions. This alternative discretization is a numerical homogenization technique known as Localized Orthogonal Decomposition (LOD). By exploring its main properties we will show why LOD approximations are no longer affected by the heterogeneities of the multiscale coefficients, but rather naturally incorporate the structural features of the (unknown) exact solution of the multiscale PDE.

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