

**Asymptotic analysis of rigidity constraints modeling
fiber-reinforced composites**

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In this talk, we discuss recent analytical results describing the effective deformation behavior of composite materials. Our model involves a rigidity constraint acting on long fibers that are semi-periodically distributed in a material body.

The main result characterizes the weak limits of sequences of Sobolev maps whose gradients on the fibers correspond to rotations. Such limits exhibit a restrictive anisotropic geometry in the sense that they locally preserve the length in the fiber direction. We illustrate the results with examples of attainable macroscopic deformations. Under additional regularization in terms of second-order derivatives in the directions orthogonal to the fibers, the model is less flexible, and only rigid body motions can occur.

Joint work with Dominik Engl (Utrecht University) and Carolin Kreisbeck (KU Eichstätt-Ingolstadt).