

## Homogenization of long fiber reinforced composites including fiber bending effects - DTU Orbit (09/11/2017)

### Homogenization of long fiber reinforced composites including fiber bending effects

This paper presents a homogenization method, which accounts for intrinsic size effects related to the fiber diameter in long fiber reinforced composite materials with two independent constitutive models for the matrix and fiber materials. A new choice of internal kinematic variables allows to maintain the kinematics of the two material phases independent from the assumed constitutive models, so that stress-deformation relationships, can be expressed in the framework of hyper-elasticity and hyper-elastoplasticity for the fiber and the matrix materials respectively. The bending stiffness of the reinforcing fibers is captured by higher order strain terms, resulting in an accurate representation of the micro-mechanical behavior of the composite. Numerical examples show that the accuracy of the proposed model is very close to a non-homogenized finite-element model with an explicit discretization of the matrix and the fibers.

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Authors: Poullos, K. (Intern), Niordson, C. F. (Intern)

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