Micromorphic media: Interpretation by homogenisation

By Ralf Jänicke

Shaker Verlag Okt 2010, 2010. Buch. Book Condition: Neu. 21x14.8x cm. Neuware - In order to develop more and more resource-saving strategies for engineering tasks, the efficient application of cellular materials, such as various open cell foams, is of high interest in science and technology. Strongly influenced by their underlying microtopology, cellular materials feature a complex material behaviour. Modelling aspects to be taken into account are e.~g.~the deformation induced evolution of anisotropy and porosity on the one hand and the description of size dependent stiff or soft boundary layers, activated by the interaction close to material interfaces, on the other hand. The present contribution is focusing on that second feature by introducing a numerical homogenisation procedure. It allows to replace the heterogeneous microcontinuum by a homogeneous micromorphic macrocontinuum. Doing so, the microstructural deformation mechanisms can be geometrically interpreted as generalised degrees of freedom, which can be transferred on the macroscopic level. In the context of a two-scale FE strategy, the macroscopic constitutive equations are replaced by the computation of a nested microscopic boundary value problem in each macroscopic material point. The power of the proposed interpretation of the micromorphic degrees of freedom in combination with the numerical homogenisation approach is...

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