

Elektrotechnik-Elektronik-Informationstechnik

EEI KOLLOQUIUM

A lightweight smart material: polymeric foam-ferromagnet composites

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Raum BR LSE 01.030, Konrad-Zuse-Straße 3-5, 91052 Erlangen

Diskussionsleitung: Dr. Alexander Sutor

The talk shows the development of a new class of composite smart foams, lightweight and multifunctional, with magnetomechanical properties and macroscopic behavior that can be controlled by a suitable applied magnetic field (MF). The foams are made by embedding magnetic particles, micrometric or nanometric in size, spread into the polymeric matrix during the foaming process. In presence of a suitable MF, particles align themselves along magnetic field lines leading to an anisotropic structural reinforcement. For example, a fibrous aggregation of particles along the force lines of a uniform MF can easily be obtained. The consequent structural behavior is anisotropic, reinforced along the alignment direction. Moreover, the constitutive relationships show a magneto-mechanical coupling: once produced, MAPs can be controlled through an adequate MF. This further smart functionality makes the porous material a sort of "active" one where the mechanical variables can be contactlessly controlled by the MF. This feature may be used for actuation purposes.

Finally, experimental results will be presented about "passive" mechanical behavior (stress-strain curves) and "active" behavior (stress controlled by the magnetic field).