

Die Vorträge finden jeweils um 16.15 Uhr im Hörsaal H3, Egerlandstr. 3 statt.  
Alle Interessenten sind herzlich eingeladen.

## 10. Dezember 2009

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## Self-healing of composite materials

Self Healing Materials are a rather new research field, covering metals, polymers, concrete and composites.

After a broader introduction to the field, the example of sintered particle systems is discussed in more detail:

Using an advanced history dependent contact model for DEM simulations, including elasto-plasticity, viscosity, adhesion, and friction, pressure-sintered tablets are formed from primary particles. These tablets are subjected to unconfined uni-axial compression until and beyond failure. For fast and slow deformation we observe ductile-like and brittle softening, respectively. We propose a model for *local self-healing* that allows damage to heal during loading such that the material strength of the sample increases and failure/softening is delayed to larger strains. Local healing is achieved by increasing the (attractive) contact adhesion forces for those particles involved in a potentially breaking contact. We examine the dependence of the strength of the material on (a) the damage detection sensitivity, (b) the damage detection rate, and (c) the (increased) adhesion between healed contacts. The material strength is enhanced, i.e., the material fails at larger strains and reaches larger maximal stress values, when any of the parameters (a) – (c) is increased. For very large adhesion between the healed contacts an interesting instability with strong (brittle) fluctuations of the healed material's strength is observed.