

## Abstract Mini-symposium

### Emerging non-linear mechanical properties in multi-scale materials

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Multi-scale materials are often complex to model in the sense that they can exhibit macroscale properties that are not present at the microscale. Some properties emerge on the macroscopic scale, leading to the constitutive richness of such materials. One basic challenge is to examine whether such emergences can be recovered from up-scaling and homogenization processes. Regarding this perspective, the case in granular materials where geometrical effects make emerge a complex macroscopic behavior is particularly meaningful. These effects can be approximated at continuum scale with non-associated plasticity or even non-local continuum mechanics. The purpose of this mini-symposium is to discuss how micromechanical features can be responsible of macroscale properties of a different nature (i.e. not present at the microscale). Contributions based on numerical simulations as well as experiments coupled with advanced imaging techniques are welcome. If granular materials are emphasized, the scope of this mini-symposium is of course not limited to this particular class of multi-scale materials.