

## GSH and the $\mu(I)$ -rheology

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Two approaches exist to account for granular dynamics: The athermal one takes grains as elementary particles, the thermal consideration includes also the entropic contribution from the grains' microscopic degrees of freedom -- such as phonons and electrons. Discrete element method (DEM), granular kinetic theory and athermal statistical mechanics (ASM) belong to the first, granular solid hydrodynamics (GSH) to the second approach.

A discussion of the conceptual differences between both is given in this talk, leading, among others, to the insight that while DEM and granular kinetic theory are well justified to take grains as athermal, ASM is not likely to succeed. Conversely, GSH, the more complete theory, delivers a unified framework for a broad range of granular phenomena.

GSH is then employed to come to terms with the  $\mu(I)$ -rheology, its theoretical foundation and range of validity. A number of interesting questions worthy of further scrutiny are posed in this context.

