Topological Invariants in Fixed Point Theory and Dynamical Systems
Gdańsk University of Technology, January 29–31, 2024

Discreteness, stochasticity, geometry, topology and mechanical energy in small soft granular structures.

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30 01 2023

Soft granular materials, such as dense foams, emulsions and biological tissues, consist of densely-packed deformable grains, separated by a thin layer of a lubricating fluid. In such naturally occurring systems, the physical spatial discreteness on the relatively large scale of the individual grain leads to complex behaviours such as memory effects, avalanches, plasticity and viscoelasticity. But what happens when the entire structure is only several times bigger than the individual grain? Too small for continuum approximations to take hold, yet too large to avoid the complicated mess of many-body physics? The talk will discuss new fascinating physical and mathematical properties observed as a soft granular material is split by external flows into small and medium-sized clusters and as these clusters are subjected to further external forces and discuss how energetic, geometrical and topological properties of the material lead to its exotic physical behaviours.