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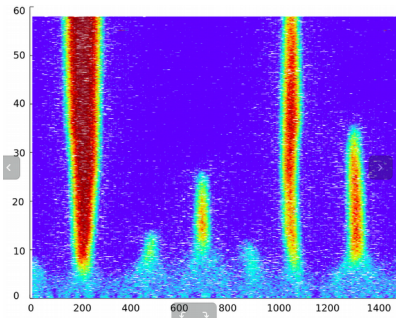
Research Interests:

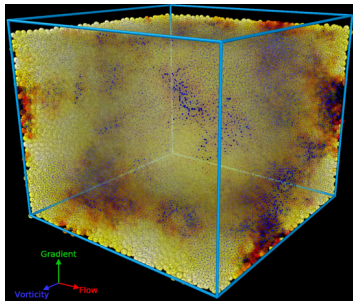
- Evolution of metastable and out-of-equilibrium systems
- Rheology of dense disordered systems
- Bio-inspired material design

Brief Summary of Research:

My primary research work pivot around understanding the evolution of metatstable materials (eg., supercooled liquid) and out-of-equilibrium systems (eg., amorphous solid) under thermal fluctuations and/or mechanical perturbations. At finite temperatures and pressures I study the phase behaviour of metastable liquids focussing on the novel liquid-liquid phase transition, structure-dynamics relationship as well as aspects of multi-step nucleation process. Materials such as amorphous solids including emulsions, foams, cement etc., are out-of-equilibrium systems which fall under the category where thermal fluctuations has less influence on their evolution. Under mechanical perturbations like shear or vibration, these materials evolve, yield and eventually flow. I study the fundamental aspects of yielding phenomenon, macroscopic flow properties and associated microscopic signatures. These studies has enabled me to explore the analogy between the thermal noise and the mechanical noise.



Coarsening of shear bands
during steady state shear flow



Local rearragements and
stress reorganisation in a dense solid

Recent Publications:

1. Rate Dependence of Elementary Rearrangements and Spatiotemporal Correlations in the 3D Flow of Soft Solids. Vishwas V. Vasisht, Sudeep K. Dutta, Emanuela Del Gado, and Daniel L. Blair, Physical Review Letters 120 018001 (2018).
2. Nesting of anomalies in supercooled silicon. Vishwas V Vasisht, John Mathew, Shiladitya Sengupta and Srikanth Sastry, Journal of Chemical Physics 141 124501 (2014).