Boundary conditions for yield stress fluids in porous media: statistical properties and universality class

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The flow of yield stress fluids in porous media is interestingly complex due to the interplay between the medium's heterogeneity and non-linear rheology. For instance, a nonlinear Darcy law emerges as the number of flow paths increases with the applied pressure difference.

In this talk, we will discuss how the boundary conditions influence the flow field. Unlike the Newtonian case, the type of boundary condition applied to the system has a significant effect on the flow over a large distance. We will therefore discuss how this distance is controlled by the directed polymer problem, which minimises the energy of a path in a random field and was introduced by Kardar, Parisi and Zhang in 1987.

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