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Characterisation of contact forces and force chains in sheared granular systems

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Active faults often contain distinct accumulations of granular fault gouge. Laboratory experiments and numerical simulations of sheared granular materials suggest that applied loads are preferentially transmitted across such systems by transient force networks that carry enhanced forces. An effective characterisation of these features is important since their nature and persistence may influence the mechanical stability of the systems and potentially that of natural faults.

Recently, Ostojic and coworkers proposed a mapping of force networks onto a percolation problem, which allowed them to use measures from the percolation theory to characterise the force networks. We will discuss the application of this method to 3D simulations of a sheared granular media.

Given granular systems with different grain size distributions, we require a global measure that can be used in "meaningful" comparisons of the systems. This in turn demands that we ought to have a measure that relates to global effects rather than wildly oscillating local values. We propose to use a measure that in broad sense measures the global force orientation. This is accomplished by making a distribution of grain contact force angles weighted by the force magnitudes, giving a useful measure of the preferred force orientation and spread around this value.