

DEM Simulation of Structural Development Processes-4; Stresses and velocity distribution of particles

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Physical modelling using granular materials (i.e. sandbox experiments) can simulate the brittle behaviour of the upper crust, thus has been applied to a number of geologic structures in various scales with a great success. This type of physical experiments can also be done as numerical simulation (digital modelling) with the Discrete Element Method (DEM). This refers that the method has potential ability to examine such tectonic deformations.

As an example of DEM simulation of large scale tectonic deformation, the collision process of the Indian sub-continent to the Eurasian Plate was examined. We followed the geologic model by Tapponier et al. (1976), and have succeeded to reproduce the deformation geometry similar to their analogue model. Currently, we are working to extract information of each particle, such as displacement path and stress fields. These can be compared with GPS and seismicity data, which express present deformation of the region.

Despite the technique needs further refinements, in particular the input parameters being tuned, the DEM approach to geologic deformations can be a powerful tool to simulate fault related structures and also to analyse the deformation quantitatively.