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BUTSURI-TANSA(Geophysical Exploration)

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[\[Image PDF \(1797K\)\]](#) [\[References\]](#)**Discrete element simulations of continental collision in Asia**

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ABSTRACT Analogue physical modelling using granular materials (i.e., sandbox experiments) has been applied with great success to a number of geological problems at various scales. Such physical experiments can also be simulated numerically with the Discrete Element Method (DEM). In this study, we apply the DEM simulation to the collision between the Indian subcontinent and the Eurasian Plate, one of the most significant current tectonic processes in the Earth.

DEM simulation has been applied to various kinds of dynamic modelling, not only in structural geology but also in soil mechanics, rock mechanics, and the like. As the target of the investigation is assumed to be an assembly of many tiny particles, DEM simulation makes it possible to treat an object with large and discontinuous deformations. However, in DEM simulations, we often encounter difficulties when we examine the validity of the input parameters, since little is known about the relationship between the input parameters for each particle and the properties of the whole assembly. Therefore, in our previous studies (Yamada et al., 2002a, 2002b, 2002c), we were obliged to tune the input parameters by trial and error.

To overcome these difficulties, we introduce a numerical biaxial test with the DEM simulation. Using the results of this numerical test, we examine the validity of the input parameters used in the collision model. The resulting collision model is quite similar to the real deformation observed in eastern Asia, and compares well with GPS data and in-situ stress data in eastern Asia.

Key words: tectonics, analogue experiment, numerical simulation, discrete element

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