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STOCHASTIC METHODS IN MECHANICS OF GRANULAR BODIES

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P R E F A C E

When discussing the mechanics of soil, rocks and loose media the models of the so called mechanics of continuous media are in general use. This model assumes the invariant of the contact relations between the elements of the media. In case of the above media being in motion the invariant relation of the contacts is not maintained. Contacts between these elements change, the ordered relation is not maintained, and the elements intermingle. The motion of the medium is characterized by the mass character of random changes in contact relations and consequently by random displacement of the medium elements.

The movement of such a collection of elements depends on their mechanical properties only in a small degree, being mainly dependent on their spatial structure. Since the interaction of the elements has a mass and random character, the summary effect of displacements of elements is defined by random laws in agreement with the central limiting theorems.

These heuristic considerations suggest the idea of describing the displacements of a loose medium on the basis of a model different from the model of a model different from the model of a continuous medium.

That model may be regarded as a system of integral equations which are generalizations of the Smoluchowski equation describing the stochastic processes of the Markov type. In particular, from this system a parabolic system of differential equations, defining the mean values of displacement components of a loose medium, can be obtained.

Solutions for a number of cases of boundary conditions of this system have been given. The results have been compared with the displacement measurements obtained in experiments carried out in a loose medium in which the corresponding boundary conditions have been realized.

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