

Abstract.

A DYNAMICAL THEORY OF TWO-DIMENSIONAL GRANULAR MEDIA MODELED AS COSSERAT CONTINUA

In this paper a mathematical theory is developed for two-dimensional granular media, which are modeled as Cosserat media, in the context of continua with vectorial microstructure. Equations of motion of the two-dimensional granular medium are obtained in intrinsic form. Constitutive relations, which depend on the deformation gradient and additional variables suitable for describing the internal structure of the medium, are introduced. Under the theory developed, the evolution of both macroscopic and microscopic quantities is described by a single system of equations. The existence of a strain energy function is assumed, and dissipation is accounted for. Many questions, however, remain open. In this talk some of the open questions will also be discussed.

In studies of continua with vectorial microstructure, one important question concerns the measurement of microstructural parameters. One possible way to ascertain the values of such parameters is to study wave propagation in the medium, as wave amplitude and wave speed depend on the microstructural parameters. As part of this talk, propagation of bell-shaped and kink-shaped waves, under some balance conditions between non-linearity, dispersion and dissipation, will be presented.