Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

A numerical study of unsteady shear flows of fluid-saturated granular materials in the presence of gravity CHRISTOS VARSAKELIS, MILTIADIS PAPALEXANDRIS, Université catholique de Louvain — In this talk we present results from a numerical study of unsteady, shear flows of fluid-saturated granular materials in the presence of gravity. In our study, we employ a two-pressure, two-velocity continuum model for the mixtures of interest. The governing equations are integrated via a predictor-corrector algorithm that combines a projection method for the pressure of each phase and an interface-tracking scheme. Initially, a high particle concentration ball is placed between two parallel plates while the rest of the domain is filled with a carrier fluid. The mixture is set in motion by the horizontal movement of the upper plate with constant speed. Because of the developing shear stresses and the onset of the Rayleigh-Taylor instability, the ball deforms to a wavy finger-like shape whose length increases with time. Further, fluid entrainment produces a mushroom pattern in its frontal part. At the same time, this granular finger descends due to gravity and once it reaches the bottom plate it forms an asymmetric granular pile. This talk concludes with results from a parametric study with respect to the shear rate and the diameter of the particles.

Christos Varsakelis
Université catholique de Louvain

Date submitted: 30 Jul 2012 Electronic form version 1.4