

Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Transverse Instability of Granular Avalanches¹ IGOR ARANSON,
Argonne National Laboratory , FLORENT MALLOGGI, ERIC CLEMENT, ES-
PCI, Paris, France — Recent experiments with dry and underwater avalanches
revealed a surprising new phenomenon: transverse instability and fingering of
avalanche front propagating on erodible granular substrate. In order to describe
this phenomenon we applied order parameter model of partially fluidized granular
flows which was successfully tested on downhill and triangular avalanches in thin
granular layers. In the framework of our model we obtained a family of “solitary”
front solutions with the velocity and the height of the front determined by the depth
of erodible substrate, the inclination angle, and fronts total mass. We have found
that the front exhibits transverse instability in the certain range of substrate depth
and inclination angles, in good agreement with the experiment. The primary mech-
anism of the transverse instability is related to the dependence of the front velocity
on the mass of granular material it carries, and is not triggered by the granular size
segregation

¹Supported by US DOE, contract W-31-109-ENG-38

Igor Aronson
Argonne National Laboratory

Date submitted: 09 Aug 2005

Electronic form version 1.4