NEAR SURFACE SOIL-GAS FLOW DUE TO IMPACT ON VENUS;
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Radar imaging from the Magellan mission have revealed a diversity of
special features of impact craters on the Venus [1,3]. The most striking
details are bright halos and dark margins around craters [3] as well as the
wind streak of the deposited (or redeposited) material [2]. The aim of this
paper is to present some experimental data of the laboratory simulation of
the atmospheric-ground interaction during impact. The important role of at-
omospheric shock waves generated by impact as well the importance of tempo-
rary wind flows behind the wave have been outlined earlier [4, 5].

Experimentally the atmospheric shock waves and post-shock flow has been
simulated by the vertical long (1 m), thin (4 mm) line HE charges of RDX,
detonated above the surface covered with a layer of fine sand. The frame No.
0 of the experimental movie demonstrates the general arrange of the exper-
iment (1 - the vertical HE charge; 2 - Al plate 100x100x1.5 cm; 3 - the sand
circular layer 40 cm in diameter and 2 mm thick; 4 - the sand band 2 cm wide
and 5 mm thick; 5 - the hollow steel cylinder with sand in the central hole
65 mm depth; 6 - the obstacle 10 mm high).

On the frame No.1 just after detonation the sand motion is observed
only in the central region. The frame No. 2 is exposed .015 s later when the
shock wave front goes 5 m from the center. Here one can see first mani-
festation of the sand motion. The mean velocity of the inner boundary of the sand
strip between frames No.2 and No.3 during .015 s is about 1.3 m/s. At t=1 s
the velocity increases up to 5.2 m/s. The shock wave front at this moment is
30 m apart. The sand motion is visible up to t=5 s (frames No. 2 to 5).

The experimental data show that the main motion of the sand occur far
behind the shock front. A toroidal vortex seems to originate around zero
point. The air velocity in the vortex is about 10 m/s at t = .1 s.

Sand particles are involved in the air stream not by direct aerodynamic
action, but mainly by the process of the "back venting" [5]. The effect in-
cludes pumping of air into porous soil during the passage of the shock wave
and air back venting after decompression. The latter stage is accompanied by
soil particles uplift above the initial ground level due to expansion of
compressed air in porous between particles. The effect can be seen very well
at the frame No. 2 where sand "flow out" from the hollow steel cylinder (5)
and from the holes at the corners of the Al plate. The frame No. 5 clearly
demonstrates the sand condensation in front of and the sandless "shadow"
behind the obstacle (6). It means that the sand flow occur only in a thin
near surface layer.

The next step of our investigation would be to find proper scaling
rules to estimate the similar effect in natural impacts on Venus. Our
preliminary ideas are: 1 - some of the flow in the bright halos may
originate as an air-particle flow in the dense Venusian atmosphere; 2 - dark
margins are zones of a loose "soil" layer bulked due to the "back venting"
effect: the complex geometry of dark margin outlines is reflect not shock
wave parameters but the presence of the loose layer on the Venus surface.

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