

Influence of Slope Gradient on the Behavior of Saltating Sand Particles in a Wind Tunnel

Wenhai Sun¹, Ning Huang²

¹ Key Laboratory of Mechanics on Disaster and Environment in Western China, Ministry of Education, Lanzhou University, Lanzhou, China, sunwh2010@lzu.edu.cn

² Key Laboratory of Mechanics on Disaster and Environment in Western China, Ministry of Education, Lanzhou University, Lanzhou, China, huangn@lzu.edu.cn

The impact and lift-off angle of saltating particles play a very important role in aeolian research. Most earlier experimental investigations and numerical simulations were carried out on flat sand beds to study the angle of saltating particles. However, the slope gradient has a great influence on the characteristics of saltating particles. In this paper, the impact and lift-off angle near the sloping bed, including windward and leeward directions, is measured in a wind tunnel. Unlike the trend of exponential decay observed on flat beds, the lift-off and impact angles over the windward and leeward slopes showed log-normal and exponential distribution, respectively. On the windward slope, the impact angle ranged from 15° ~ 25° , and the lift-off angle from 20° ~ 40° , which are totally different from angles reported in previous studies. On the leeward slope, the impact and lift-off angles on top and bottom of slope are were different from each other. We concluded that more investigations are needed over a variety of slopes in order to improve the predictability of wind-blown sands in complex terrain.