

Wind duct experiments on reptation particle motions using a high speed video camera

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Aeolian reptating particles, splash particles by saltating grain collision to bed, were surveyed with wind duct (width: 9 cm, depth: 56 cm, length: 7 m28 cm), using high speed video camera (Sony, NEX-FS700R /FS700RH). 3.8 mm diameter particles of polypropylene (specific gravity: 0.9) were selected for experimental material in order to trace particle motion tracks easier. The video camera, which was set aside in the center part of the wind duct, recorded 960 frames per second. Polypropylene particles were laid at 24cm thickness. Wind condition was constant: 18 m/s. From 40 particle motion tracks, we analyzed grain speeds, accelerations and jumping heights. Most saltating particle showed more than 100 cm/s in speed and repetitions between accelerations during jumping stage and rapid decelerations after hitting the bed. While reptating particles showed less than 50 cm/s in speed and less accelerations and decelerations. Jumping heights of particles were clue to distinguish between reptation and saltation. In this experimental, if jumping height exceeds twice the grain diameter, particle shows continuous saltating motion. We had also noticed that creep mode movements, moving only by wind action, were very rare phenomena.

Keywords: aeolian sediment transport mode, saltation, reptation, creep, high speed video camera, particle motion analysis