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**Two-dimensional PIV measurements for studying the effect of bed permeability on incipient motion of synthetic sediment particles**  
HENG WU, CARLO C. ZUNIGA ZAMALLOA, JORGE E. SAN JUAN BLANCO, BLAKE J. LANDRY, MARCELO H. GARCIA, University of Illinois at Urbana-Champaign — The experimental study of incipient motion, the regime where particles resting on a granular bed enter a process of sediment transport, can be approached using a single-particle pivoting model. Such pivoting model states that the fundamental mechanism of the incipient motion depends, among other factors, on the local fluid flow, bed-flow interface topology, the geometry, and specific density of the sediment particle; yet it does not specify the effect of the bed permeability. In this work the effect that bed permeability has on the incipient motion of a sediment particle is explored by conducting systematic Particle Image Velocimetry measurements of the flow around cylindrical and spherical particles at incipient motion conditions in a water flume. The permeable bed condition for the flume is achieved by placing a synthetic bed at the bottom which consists of cubically packed, uniformly sized spheres. The impermeable condition is obtained by placing at the bottom of the flume a sheet with rows of hemispheres glued to it, the hemispheres being of the same diameter as the ones in the permeable case. The mean velocity profiles are reported to illustrate the influence of the permeable or impermeable beds. The measured velocity data is also compared with the current pivoting model.

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