

## **Effect of Seepage on Initiation of Cohesionless Sediment Transport**

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### **A b s t r a c t**

This paper presents theoretical analyses and experimental results of seepage effects, especially downward seepage, on the initiation of cohesionless sediment particles. The theoretical analysis examines how the additional seepage force acts to modify the critical shear stress for sediment entrainment. Laboratory experiments were conducted using medium sand with diameter of 0.9 mm with downward seepage to quantitatively show suction effects on sediment entrainment. The critical shear stresses with different suction rates were calculated using the experimental results. The measured data together with published results provide an overall view on seepage effects on the initiation of cohesionless sediment transport. Depending on whether seepage is in the form of injection or suction, it will either increase or decrease the critical shear stress. The result reveals that the ratio of drag force at the threshold condition with seepage to that without seepage is dependent on the ratio of the hydraulic gradient with seepage to its value at the quick condition.

**Key words:** incipient motion, seepage, shear velocity, sediment transport.