

Abstract Submitted
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Investigation of the mobile granular layer in bed-load transport¹

ELISABETH GUAZZELLI, PASCALE AUSSILLOUS, Aix Marseille Univ., CNRS, IUSTI UMR 7343, JULIEN CHAUCHAT, LEGI, UJF/INPG/CNRS, MICKAEL PAILHA, LOCIE, CNRS - Univ. de Savoie, MARC MEDALE, Aix Marseille Univ., CNRS, IUSTI UMR 7343, AIX MARSEILLE UNIVERSITÉ, CNRS, IUSTI UMR 7343 TEAM, LEGI, UJF/INPG/CNRS TEAM, LOCIE, CNRS - UNIVERSITÉ DE SAVOIE TEAM — The mobile layer of a granular bed composed of spherical particles is experimentally investigated in a laminar rectangular-channel flow. Both particle and fluid velocity profiles are obtained using particle image velocimetry for different index-matched combinations of particles and fluid. While the Shields number controls incipient motion, it is not the most appropriate parameter for describing bed-load transport. The experimental observations suggest that the appropriate length-scale is the fluid height and that the proper control parameter is the dimensionless fluid flow-rate. A two-phase continuum model having a frictional rheology to describe particle-particle interactions can capture most of the experimental observations. Rheological constitutive laws having increasing degree of sophistication are discussed.

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