

MICROFORMS IN GRAVEL BED RIVERS

Abstract

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The process of formation, integration, and disintegration of cluster microforms and their associated morphology was investigated in a laboratory flume using uniform spherical glass particles for a wide range of flow conditions. Tests conducted were based on an incipient motion criterion based on the concept of “probability of entrainment”. Results showed that clusters form in the range of $1.25\tau_{cr}^* - 2.0\tau_{cr}^*$ (where τ_{cr}^* is the incipient dimensionless bed shear stress for an individual particle) and disintegrate at $3.0\tau_{cr}^*$. Relations that provide cluster spacing and orientation were determined using image analysis software. During a test, the shape of individual clusters changed from a two-particle, to a comet, to a triangle, and to a rhomboid shaped cluster before final disintegration. Clusters affected bedload transport by increasing the magnitude of the fluctuations in mass transported, up to 6 times the mean value, and by acting as sediment sources and sinks depending on flow conditions.