

The link between Movability Number and Incipient Motion in river sediments

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Abstract

The concept of incipient motion has been of continuing interest to researchers and engineers working with sediment movement in rivers. This paper takes a new look at the use of the Movability Number for the prediction of Incipient Motion – which is here defined in terms of Intensity of Motion. A relationship between Movability Number and Intensity of Motion is developed for flow with turbulent boundaries, using data from other researchers for Particle Reynolds numbers up to nearly 12 000. This allowed for a firmer definition of Incipient Motion as well as a new bedload transportation equation. Additional laboratory experimentation for Particle Reynolds number over the range 0.12-486 facilitated the improved prediction of Incipient Motion from a plot of the critical Movability Number vs. Particle Reynolds number for a wide range of boundary conditions from laminar to turbulent.

Keywords: Incipient Motion, Movability Number, river hydraulics, sediment transport