

Numerical study of river bedrock incision by bed load sediment transport

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Reptation and saltation has been shown to be the only motion modes of the bed load that contribute to bedrock river incision. Field measurements revealed that the incision rate of a river fluctuates along the year with respect to the water discharge value. Numerical model and experimental results demonstrate that the number of grains per unit surface is a crucial parameter for the incision rate efficiency. We use a numerical model based on molecular dynamics to study the motion of a bed load over a river bedrock and quantify the energy transfer that is responsible of incision. We show that the energy transfer with respect to the cover fraction present a maximum, what is the result of a competition between two antagonistic effects, the tool effect and the cover effect.