

DERIVATION OF A BEDLOAD TRANSPORT MODEL WITH VISCOUS EFFECTS

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The simulation and prediction of sediment transport are relevant for environmental engineering purposes. Two transport modes exist: bedload transport, and suspended load transport. We deal here with the former. The Shallow Water-Exner system is commonly used to model it. However, this model requires an empirical closure relationship for the sediment discharge. Our model is deduced from a fluid description of the sediment layer. It is obtained by performing simultaneously the Shallow-Water approximation and the diffusive limit in the Navier-Stokes equations. Different scalings of the viscosity coefficient allow to obtain an equation for the solid discharge with or without viscous term. The bilayer model (water and sediment layer) has an associated energy and does not need a closure relationship. In the inviscid case, the correspondence with classical solid discharge formulas used in hydraulic engineering is shown. 1D numerical results are presented.

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