

Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Numerical simulation of sediment processes - An approach for a suspension-bed-load model MARKUS BURKOW, Institute for Numerical Simulation, University of Bonn — Current driven sediment transport causes the evolution of bedforms like dunes, ripples or scour marks. In this study we use a numerical simulation of the three dimensional fluid flow and the simultaneous transport to reproduce these sediment processes. To solve the instatioary incompressible Navier-Stokes equations we use NaSt3D as fluid solver for incompressible two-phase flow problems in three dimensions. Fifth order WENO schemes are applied for spatial discretization. For temporal discretization we apply Runge-Kutta schemes up to third order. The free surface between both fluid phases is tracked with a level set technique. The main parts in sediment transport are bed load and suspension load. A common way to model the change of the sediment surface by the rearrangement of the sediment is the Exner equation. Bed load is calculated from the fluid velocities. Additionally an advection-diffusion equation is used to compute the transport of the suspension load in the fluid. Using the conservation of mass the interchange of sediment mass between bed load and suspension load is assured. Single phase examples like dunes and ripples as well as two-phase phenomena like scouring at an obstacle illustrate the large variety of sediment processes, which can be reproduced by this model.

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Date submitted: 31 Jul 2014

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