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Highly-Resolved Numerical Simulations of Bed-Load Transport in a Turbulent Open-Channel Flow

By Bernhard Vowinkel

TUDpress Verlag der Wissenschaften GmbH, United States, 2015. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.Phase-resolving Direct Numerical Simulations of bed-load transport in a horizontal turbulent open-channel flow at small relative submergence are presented. The thesis provides a detailed study addressing the impact of the choice of collision model on the scenario of bed-load transport and presents statistical tools to identify and describe the key-mechanisms governing the fluid-particle interaction. The Double-Averaging Methodology is applied for the first time to the situation of mobile rough beds. This methodology provides a framework to convolute the data in such a way that the most prominent flow features are well described by a handy set of double-averaged (in time and space) quantities. The thesis further provides a systematic study elucidating in detail the impact of the key-parameters mobility and sediment supply on the pattern formation of large-scale particle clusters. This is done using a very large computational domain to allow bed-forms to evolve with minimal spatial constraints. It is found that a low transport rate is linked to streamwise oriented ridges, while a large sediment supply results in large-scale clusters that propagate in...



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Reviews

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