VERSITA

Acta Geophysica
vol. 62, no. 1, Feb. 2014, pp. 180-198
DOI: 10.2478/s11600-013-0178-1

A Large Eddy Based Lattice-Boltzmann Simulation of Velocity Distribution in an Open Channel Flow with Rigid and Flexible Vegetation

Jakub M. GAC

Faculty of Chemical and Process Engineering, Warsaw University of Technology, Warszawa Poland; e-mail: J.Gac@ichip.pw.edu.pl

Abstract

The large eddy simulation method, based on a lattice-Boltzmann algorithm, was used to compute the vertical velocity profile in an open channel flow with submerged and emerged vegetation. The numerical method is characterized by the relatively short time of computation and low complexity. On the other hand, it allows a more realistic description of the vegetation properties relative to the methods commonly used in 1-D numerical models. For the proper conditions, the method developed in this work gives results similar to other numerical methods. These results are also in good agreement with the experimental data presented in other papers.

Key words: lattice-Boltzmann model, large eddy simulation, numerical simulations, open channel flow.