Methods and experiences of parallelizing flood models[1]

L. Hluchy, V. D. Tran

Institute of Informatics, Slovak Academy of Sciences
Dubravska cesta 9, 842 37 Bratislava, Slovakia
viet.ui@savba.sk

D. Froehlich

Parsons Brinckerhoff Quade and Douglas, Inc
909 Aviation Parkway, Suite 1500
Morrisville, North Carolina 27560 USA
Froehlich@pbworld.com

W. Castaings

LMC-IMAG
Domaine Universitaire BP 53
38041 Grenoble Cedex 9
william.castaings@inrialpes.fr

Abstract. This paper focuses on parallelization process of DaveF, a new two-dimensional depth-averaged flow and sediment transport model that allows breach development and the resulting flood wave to be simulated simultaneously. Problems encountered during parallelization and techniques used to solve them are described. The experimental results with different input data on different machines are also included.

1 Introduction

Over the past few years, floods have caused widespread damages throughout the world. Most of the continents were heavily threatened. Therefore, modeling and simulation of floods in order to forecast and to make necessary prevention is very important. The kernel of flood simulation is a numerical model, which requires an appropriate physical model and robust numerical schemes for a good representation of reality.

Simulating river floods is an extremely computation-intensive undertaking specially for situations where the flow is significantly 2D in nature. Several days of CPU-time may be needed to simulate floods along large river reaches using shallow water models. For critical situations, e.g. when an advancing flood is simulated in order to predict which areas will be threatened so that necessary prevention measures

[1] This work is supported by EU 5FP ANFAS IST-1999-11676 RTD and the Slovak Scientific Grant Agency within Research Project No. 2/7186/20