Eonfusion Flood Benchmarking Results - UK Environment Agency
Benchmarking of 2D Hydraulic Modelling Packages

This document details the results of Eonfusion Flood benchmarking tests against the tests presented in the UK-EA document “Benchmarking of 2D Hydraulic Modelling Packages” (SC080035/SR2). It should be read in conjunction with that document.

Eonfusion Flood is a dual model 2D SWE/3D SPH flood modelling package published by Myriax.

In all these tests, the following hardware and software configuration was used:

- **Software:** Eonfusion Flood 2.4.5 64-bit (20130715.1).
- **Numerical model:** 2D SWE (Finite Volume – GPU implementation).
- **CPU:** Intel® Core™2 Quad CPU Q9300, 2.50GHz, RAM 8 GB.
- **GPU:** NVidia GeForce GTX 560 Ti, VRAM 1 GB.

Test result graphs are reproduced from the original EA document with Eonfusion Flood results overlaid over the top in blue.
Test 1 – Flooding a disconnected water body
This scenario tests the wetting and drying of a disconnected water body.

Summary:
- Grid: 10m x 10m
- Time-stepping: Automatic (~1.3s)
- Run time: 18s
Test 2 – Filling of floodplain depressions
This scenario tests the modelling of inundation extent and final flood depth in a case involving low momentum flow over a complex topography.

Summary:
- Grid: 20m x 20m
- Time-stepping: Automatic (~3.1s)
- Run time: 21s
- Final volume: 97200.033m$^3$ (expected: 97200)

![Graphs showing water level over time for Test 2 - Point 1 to Point 4.]
Test 3 – Momentum conservation over a small obstruction
This scenario tests the conservation of momentum over an obstruction in the topography.

Summary:
- Grid: 5m x 5m
- Time-stepping: Automatic (~0.8s)
- Run time: 2s
Test 4 – Speed of flood propagation over an extended floodplain
This scenario tests the celerity of propagation of a flood wave and the transient velocities and depths at the leading edge of the advancing flood front.

Summary:
- Grid: 5m x 5m
- Time-stepping: Automatic (~0.5s)
- Run time: 33s
0.15m depth contours at times 1hr (left) and 3hr (right). The colour coding is consistent with the one used in the rest of this report.
Test 5 – Valley flooding
This scenario tests the simulation of a major flood inundation and prediction of flood hazard arising from dam failure (peak levels, velocities and travel times).

Summary:
Grid: 50m x 50m
Time-stepping: Automatic (~2s)
Run time: 25s
0.5m contour lines of peak depths for a section of floodplain around points 1, 2 and 6. Colour coding as in the rest of the report.

3m/s contour lines of peak velocities for the same area of floodplain as in previous figure.

Please note that a river centre line comparable to that used for analysing the results from other packages was not available for Myriax to use. Therefore, the cross section analyses from the original UK EA report are not presented here.
Tests 6A and 6B – Dam break
This scenario tests the simulation of hydraulic jumps and wake zones behind buildings using high-resolution modelling.

Summary (6A):
- Grid: 0.1m x 0.1m
- Time stepping: 0.005s
- Eddy viscosity theta: 1.2 (this is not comparable to eddy viscosity)
- Run time: 20s
Summary (6B):

Grid: 2m x 2m

Time stepping: 0.05s

Eddy viscosity theta: 1.0 (this is not comparable to eddy viscosity)

Run time: 32s
Peak velocities along Cross Section 2

- InfoWorks
- ISIS
- JFLOW
- MIKE FLOOD
- SOBEK
- TUFLOW
- TUFLOW FV

Velocity (m/s) vs Distance (m)
Test 7 – River and floodplain linking
This scenario was not tested in Eonfusion Flood due to the lack of linked 1D-2D support.

Tests 8A and 8B – Rainfall and point source surface flow in urban areas
This scenario was not tested in Eonfusion Flood due to the lack of rainfall and linked 1D-2D support.