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# Chapter 1

## Comparing the numerical results in *[Vater S., N. Beisiegel, and J. Behrens, 2019]* to results produced by the FLASH implementation in Samoa2

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This document was auto-generated. This is the **detailed** version of the document. Build time: 2020-05-20\_20-56-40,  
Revisions: Samoa: ac563f53078a581e3b4b91a8dbe65dd83e2b37a2, Test scripts: d02f9d4d4ca1a53e1380d43fe431862f4948e327

### Included scenarios

- 4.1: Lake at rest
- 4.2: Tsunami runup onto a linearly sloping beach
- 4.3: Long wave resonance in a paraboloid basin
- 4.4: Oscillatory flow in a parabolic bowl
- 4.5: Runup onto a complex three-dimensional beach
- 4.6: Flow around a conical island

### Verification method

Samoa was built using the `flash-testing(-xdmf)` branch of the repository available at <https://gitlab.lrz.de/samoa/samoa>, with the XDMF module enabled.

Evaluation and post-processing was done using the scripts available at `scripts/FlashAnalysis/verification` and `scripts/XDMF/pysamoaxdmf` in the Samoa repository. The `pysamoaxdmf` module provides a convenient python3 wrapper to parse the XDMF/HDF5 data generated by Samoa.

Each scenario directory contains at least a description file and a `simulation_data` directory containing gzipped XDMF data of the simulations evaluated. When applicable, the simulation data is stripped down to only contain relevant data, these changes are detailed in the respective description file.

The scenarios were reproduced as close as possible, however some adjustments had to be made due to differences in the way of computation in Samoa. These adjustments are detailed in their respective scenario description files.

The implementation of the scenarios can be found at `src/Flash/FLASH_Scenario.f90`.

All XDMF files may be read and rendered using the ParaView software, by selecting the “Xdmf3” reader on import.

## Compilation notes

The `xmf_fox_dir`, `xmf_hdf5_dir`, `asagi_dir`, `netcdf_dir`, `exe`, `compiler` and `mpi` configuration options are not detailed here, as they differ from machine to machine. The other compilation options, with the exception of `swe_scenario`, are as follows: - `scenario='flash'` - `flash_order='1'` - `target='release'` - `data_refinement='sample'` - `xmf='true'`

Furthermore, each test is performed two times, once for the vertex- and edge-based limiter respectively: - `limiter='BJ_vertex'` - `limiter='BJ_edge'`

Some scenarios may require ASAGI with `asagi='true'`, and/or time-dependent boundary conditions using `boundary='file'` or `boundary='function'`.

## Evaluation notes

It is assumed that the working directory is `scripts/FlashAnalysis/verification`, the `PYTHONPATH` environment variable contains `scripts/XDMF/pysamoaxdmf` and the simulation data is located at `output/`.

If not specified otherwise, the evaluation script parameters are as follows: - `-i "path/to/xmf_file.xmf"`: Relative or absolute file path of the XMF output file. `find` is used to generate time-independent commands. - `-o "path/to/output_directory"`: Relative or absolute file path of the SVG plot output directory - `-d "path/to/data_directory"`: Relative or absolute path to directory containing reference data - `-s "scenario"`: Script-specific scenario selector, see individual documentation - `-n workers`: Amount of parallel processes used for computation

## Editor's note

“[1]” is used to denote a reference to the paper, even when no bibliography is provided in the document.

The pandoc software with `latex` was used for PDF generation.

## Chapter 2

# Automating the compilation, execution and rendering of the scenarios

## Requirements

### System packages

- `bash`, with `tee`, `sed`, `grep`, `cat` and standard file handling tools like `mkdir` and `cp`
- `pandoc` (the latest), `inkscape` and some kind of `pdflatex` or `xelatex` for the compilation to PDF
- `python3`, `pip3`, `node`

### Pip packages

- `numpy` for computation
- `scipy` for advanced interpolation
- `numba` for JIT LLVM compilation
- `pandas` for dataset processing
- `psutil` for controlling worker threads
- `matplotlib` for plotting
- `pandocfilters` for the compilation to PDF

# Chapter 3

## Scenario 4.1: Lake at rest

### Notes

Two simulation data sets with different temporal resolutions are provided, one with 400 and one with 4000 output steps. For evaluation, the 4000-step variant is used, the 400-step variant is used only for development and testing purposes.

The refinement level 11 was chosen, which results in a triangle leg length of about 0.022 and 4096 cells - the same as in [1]: see section 4.1, paragraph two, and compare with figure 4, left panel.

The dry/wet tolerance of  $10e-6$  and simulation time of 40 seconds were directly taken from [1].

The courant number of 0.3 was found using trial and error. The average computation time step size is about 0.001333 resp. 0.00125 seconds, while the fixed time step size in [1] is 0.002 seconds.

### Evaluation

The L2 and Lsup limiter errors are computed and subsequently plotted by comparing the numerical results to the analytical solution. These results can then compared with [1], see figure 3 and 4.

### Configuration sources

- File: `configs/machines/supermuc/config.json`
- File: `configs/flash.json`
- File: `configs/scenarios/resting_lake.json`
- Inline: `{"samoa_dir": ".../samoa-flash", "cache_dir": "/opt/samoa/time-to-solution/flash", "run": {"output_base": "/opt/samoa/output"}}`

### Build configuration templates

#### Build 1 (c99b02ec)

Key	Value
asagi	false
flash_order	1
limiter	BJ_edge

Key	Value
scenario	flash
swe_scenario	resting_lake

## Build 2 (f61db32a)

Key	Value
asagi	false
flash_order	1
limiter	BJ_edge
scenario	flash
swe_scenario	resting_lake2

## Build 3 (c538893f)

Key	Value
asagi	false
flash_order	1
limiter	BJ_vertex
scenario	flash
swe_scenario	resting_lake

## Build 4 (a894055d)

Key	Value
asagi	false
flash_order	1
limiter	BJ_vertex
scenario	flash
swe_scenario	resting_lake2

## Run configuration templates

### Run 1

Key	Value
courant	0.3d0
dmax	11
dmin	11
dry_tolerance	0.000001d0
execute	mpirun -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output

Key	Value
output_dir	_scenario_base/swe_scenario/limiter
partition	test
threads	48
time	00:30:00
tmax	40
tout	0.01d0
xdmf_output	""

## Postprocessing configuration templates

### Task 1

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/resting_lake.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s swe_scenario

## Expanded computation jobs

### Job 1 (9938e6ec): Run 1 using Build 1 (c99b02ec)

Key	Value
courant	0.3d0
dmax	11
dmin	11
dry_tolerance	0.000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	resting_lake/resting_lake/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	40
tout	0.01d0
xdmf_output	""

### Job 2 (6abc4dbf): Run 1 using Build 2 (f61db32a)

Key	Value
courant	0.3d0
dmax	11
dmin	11
dry_tolerance	0.000001d0

Key	Value
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	resting_lake/resting_lake2/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	40
tout	0.01d0
xdmf_output	""

### Job 3 (dc135ffd): Run 1 using Build 3 (c538893f)

Key	Value
courant	0.3d0
dmax	11
dmin	11
dry_tolerance	0.000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	resting_lake/resting_lake/BJ_vertex
partition	test
threads	48
time	00:30:00
tmax	40
tout	0.01d0
xdmf_output	""

### Job 4 (5df60d13): Run 1 using Build 4 (a894055d)

Key	Value
courant	0.3d0
dmax	11
dmin	11
dry_tolerance	0.000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	resting_lake/resting_lake2/BJ_vertex
partition	test

Key	Value
threads	48
time	00:30:00
tmax	40
tout	0.01d0
xdmf_output	““

## Expanded postprocessing calls

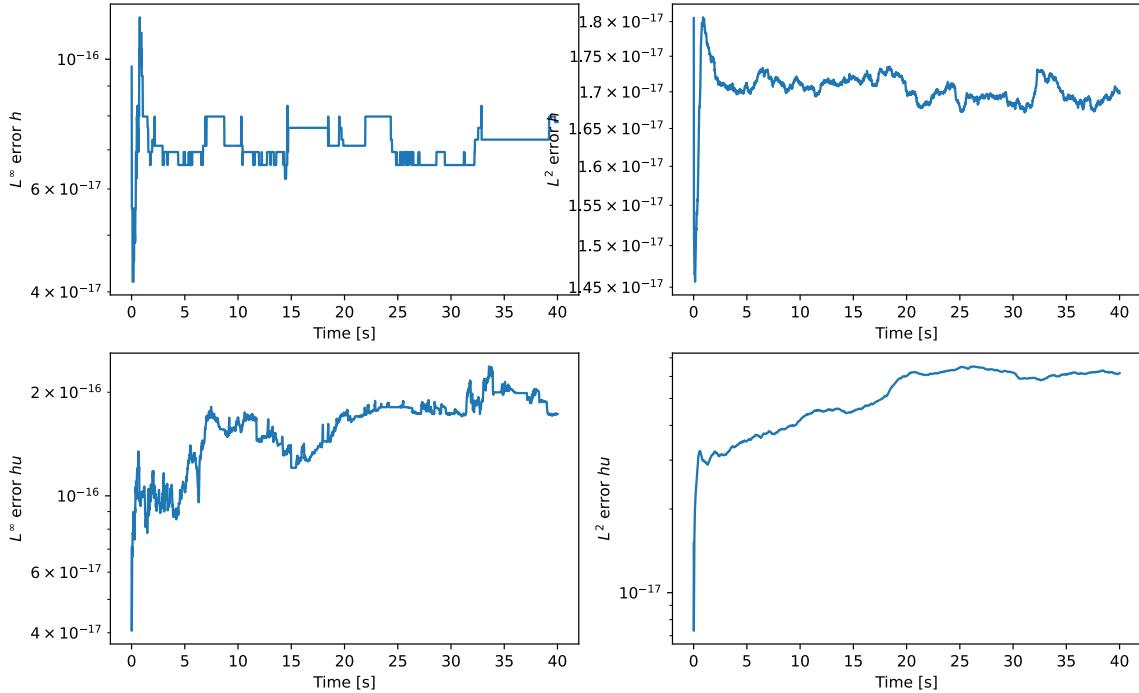
Process 1 (f0beb018): Task 1 using Job 1 (9938e6ec)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/resting_lake.py -i `find "/opt/samoa/output/resting_lake/resting_lake/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/resting_lake/resting_lake/BJ_edge -n 48 -s resting_lake

## Results

/opt/samoa/time-to-solution/flash/results/resting\_lake/resting\_lake/BJ\_edge/resting\_lake.svg

Lake at Rest: First bathymetry (center island)  
 $L^\infty$  and  $L^2$  errors for  $h$  and  $hu$

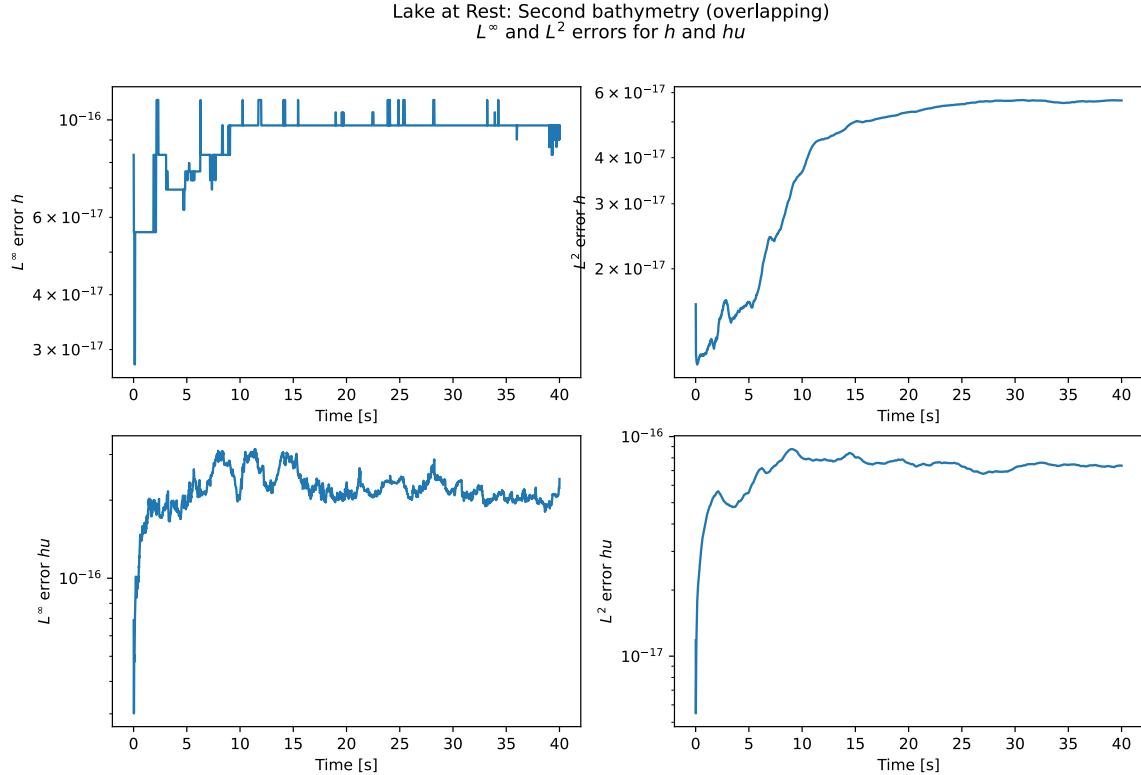


Process 2 (7ca13ff1): Task 1 using Job 2 (6abc4dbf)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/resting_lake.py -i `find "/opt/samoa/output/resting_lake/resting_lake2/BJ_edge/" -type f -name '* .xmf'` -o \$CACHE/results/resting_lake/resting_lake2/BJ_edge -n 48 -s resting_lake2

## Results

/opt/samoa/time-to-solution/flash/results/resting\_lake/resting\_lake2/BJ\_edge/resting\_lake2.svg



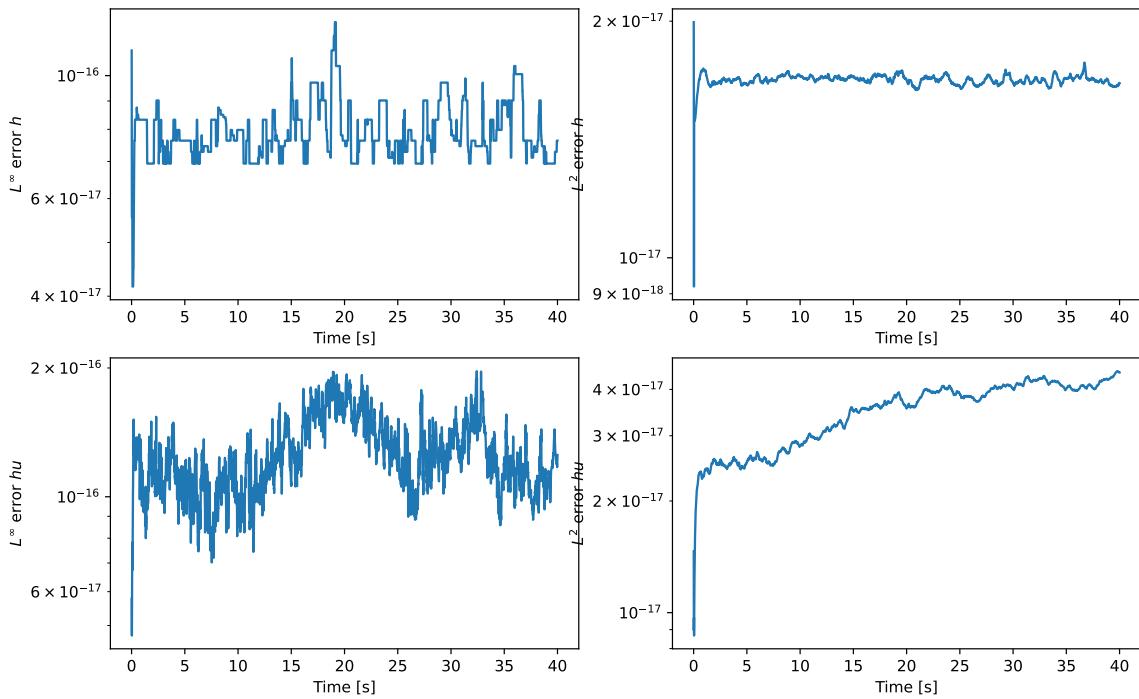
## Process 3 (1e592f65): Task 1 using Job 3 (dc135ffd)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/resting_lake.py -i `find "/opt/samoa/output/resting_lake/resting_lake/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/resting_lake/resting_lake/BJ_vertex -n 48 -s resting_lake

## Results

/opt/samoa/time-to-solution/flash/results/resting\_lake/resting\_lake/BJ\_vertex/resting\_lake.svg

Lake at Rest: First bathymetry (center island)  
 $L^\infty$  and  $L^2$  errors for  $h$  and  $hu$



#### Process 4 (ed8920d3): Task 1 using Job 4 (5df60d13)

---

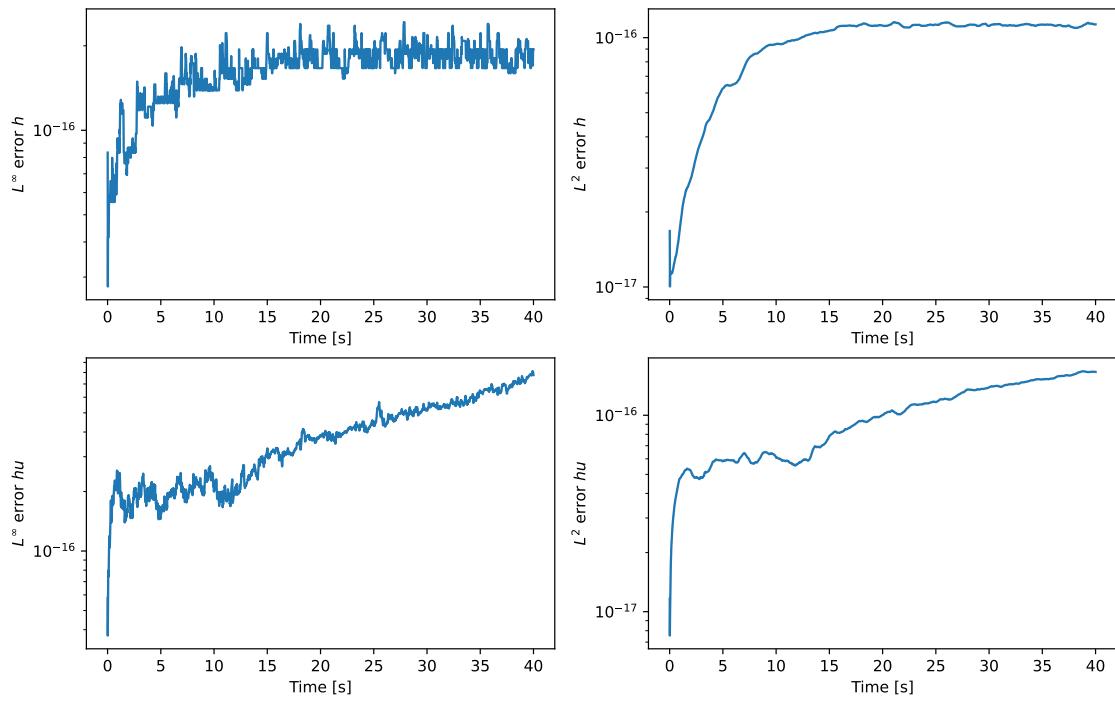
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/resting_lake.py -i `find "/opt/samoa/output/resting_lake/resting_lake2/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/resting_lake/resting_lake2/BJ_vertex -n 48 -s resting_lake2

---

#### Results

/opt/samoa/time-to-solution/flash/results/resting\_lake/resting\_lake2/BJ\_vertex/resting\_lake2.svg

Lake at Rest: Second bathymetry (overlapping)  
 $L^\infty$  and  $L^2$  errors for  $h$  and  $hu$



# Chapter 4

## Scenario 4.2: Tsunami runup onto a linearly sloping beach

### Notes

Analytical solutions for specific points in time are provided by [http://isec.nacse.org/workshop/2004\\_cornell/bmark1.html](http://isec.nacse.org/workshop/2004_cornell/bmark1.html) and converted to CSV here.

The refinement level 20 was chosen, which results in a triangle leg length of about 49.219 - roughly the same as in [1] (50): see section 4.2, paragraph two.

The dry/wet tolerance of  $10e-2$  was directly taken from [1]. The simulation time of 230 seconds was chosen to fit all interesting points in time.

The courant number of 0.35 was found using trial and error. The average computation time step size is about 0.0155 seconds, while the fixed time step size in [1] is 0.04 seconds.

A XDMF output filter is used to limit the output to a small horizontal slice in the middle. This is to reduce disk space usage. Furthermore, unused HDF5 chunks were removed manually from the dataset (The `-light` dataset).

The y axis offset was changed such that the bathymetry is zero at the coordinate origin. This was done to ensure the correct calculation of the water level offset.

### Evaluation

A z-cross-section is interpolated and plotted for all relevant variables, and compared to the analytical solution at  $t = 160, 175, 220$ . These results can then be compared with [1], see figure 6.

Line 19 in `linear_beach.py` may be modified to interpolate at different z values (default: 25000).

### Configuration sources

- File: `configs/machines/supermuc/config.json`
- File: `configs/flash.json`
- File: `configs/scenarios/linear_beach.json`
- Inline: `{"samoa_dir": ".../samoa-flash", "cache_dir": "/opt/samoa/time-to-solution/flash", "run": {"output_base": "/opt/samoa/output"}}`

## Build configuration templates

### Build 1 (61d5fde4)

Key	Value
asagi	false
flash_order	1
limiter	BJ_edge
scenario	flash
swe_scenario	linear_beach

### Build 2 (d2c91d27)

Key	Value
asagi	false
flash_order	1
limiter	BJ_vertex
scenario	flash
swe_scenario	linear_beach

## Run configuration templates

### Run 1

Key	Value
courant	0.35d0
dmax	20
dmin	20
dry_tolerance	0.01d0
execute	mpexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/limiter
partition	test
threads	48
time	00:30:00
tmax	220
tout	5.0d0
xdmf_filter_index	1
xdmf_filter_params	-400 50000 24950 25050
xdmf_output	““

## Postprocessing configuration templates

### Task 1

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/linear_beach.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -d .../.../post/reference/linear_beach

### Expanded computation jobs

#### Job 1 (b445159e): Run 1 using Build 1 (61d5fde4)

Key	Value
courant	0.35d0
dmax	20
dmin	20
dry_tolerance	0.01d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	linear_beach/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	220
tout	5.0d0
xmf_filter_index	1
xmf_filter_params	-400 50000 24950 25050
xmf_output	““

#### Job 2 (2c44a92b): Run 1 using Build 2 (d2c91d27)

Key	Value
courant	0.35d0
dmax	20
dmin	20
dry_tolerance	0.01d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	linear_beach/BJ_vertex
partition	test

Key	Value
threads	48
time	00:30:00
tmax	220
tout	5.0d0
xdmf_filter_index	1
xdmf_filter_params	-400 50000 24950 25050
xdmf_output	““

## Expanded postprocessing calls

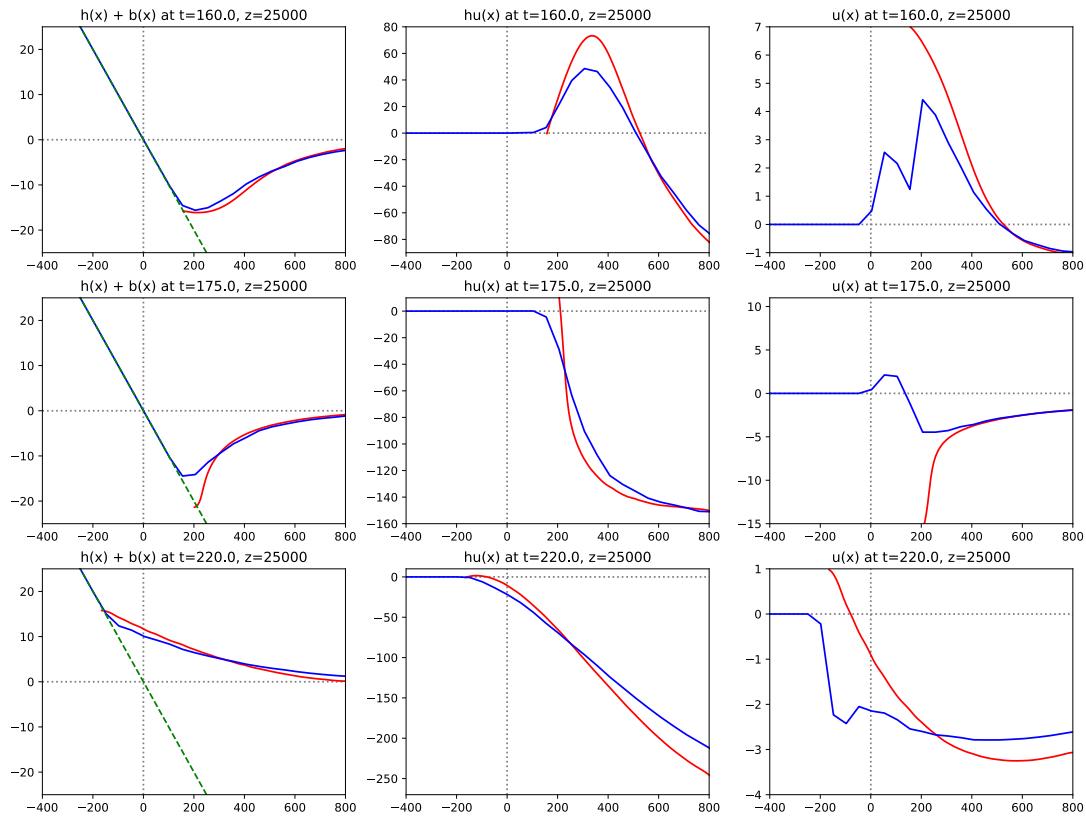
Process 1 (fba45b22): Task 1 using Job 1 (b445159e)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/linear_beach.py -i `find "/opt/samoa/output/linear_beach/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/linear_beach/BJ_edge -n 48 -d .../.../post/reference/linear_beach

## Results

/opt/samoa/time-to-solution/flash/results/linear\_beach/BJ\_edge/csvcomp.svg

Tsunami runup onto a linearly sloping beach  
Comparison to exact solution at z=25000, t=160.0, 175.0, 220.0



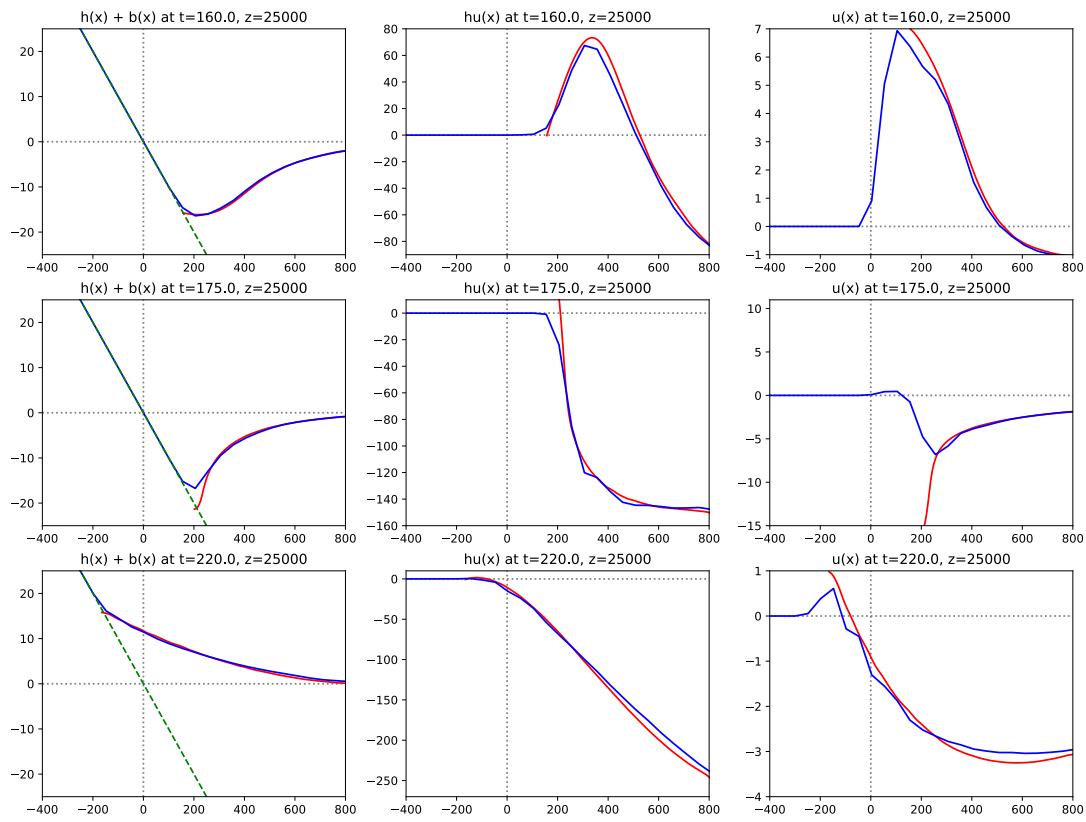
Process 2 (3936ea47): Task 1 using Job 2 (2c44a92b)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/linear_beach.py -i `find "/opt/samoa/output/linear_beach/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/linear_beach/BJ_vertex -n 48 -d .../.../post/reference/linear_beach

## Results

/opt/samoa/time-to-solution/flash/results/linear\_beach/BJ\_vertex/csvcomp.svg

Tsunami runup onto a linearly sloping beach  
 Comparison to exact solution at  $z=25000$ ,  $t=160.0, 175.0, 220.0$



# Chapter 5

## Scenario 4.3: Long wave resonance in a paraboloid basin

### Notes

The refinement level 15 was chosen, which results in a triangle leg length of about 88.39 - the same as in [1]: see section 4.3, paragraph two.

The dry/wet tolerance of  $10e-2$  resp.  $10e-8$  was directly taken from [1].

The courant number of 0.2 was found by using a estimated average of the values given in [1]. The average computation time step size is about 0.451 seconds, while the fixed time step size in [1] is 2.534 seconds.

The datasets only contain the timesteps at  $t = n * 0.25P$  from  $t = 0$  up to  $t = 2P$  to save space.

### Evaluation

A z-cross-section is interpolated at  $z = 0$  and plotted for all relevant variables, and compared to the analytical solution at  $t = 1.5P$ ,  $1.75P$ ,  $2P$ . These results can then be compared with [1], see figure 7 and 8.

Contour plots at  $t = 2P$  are generated for the full domain. These results can then be compared with [1], see figure 9.

### Configuration sources

- File: `configs/machines/supermuc/config.json`
- File: `configs/flash.json`
- File: `configs/scenarios/longwave_basin.json`
- Inline: `{"samoa_dir": ".../samoa-flash", "cache_dir": "/opt/samoa/time-to-solution/flash", "run": {"output_base": "/opt/samoa/output"}}`

### Build configuration templates

Build 1 (6276513f)

Key	Value
asagi	false
flash_order	1
limiter	BJ_edge
scenario	flash
swe_scenario	longwave_basin

## Build 2 (78162e11)

Key	Value
asagi	false
flash_order	1
limiter	BJ_vertex
scenario	flash
swe_scenario	longwave_basin

## Run configuration templates

### Run 1

Key	Value
courant	0.2d0
dmax	15
dmin	15
dry_tolerance	0.01d0
execute	mpexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/dw10e-2/limiter
partition	test
threads	48
time	00:30:00
tmax	3546.258383607218d0
tout	443.28229795090225d0
xdmf_output	""

### Run 2

Key	Value
courant	0.2d0
dmax	15
dmin	15
dry_tolerance	0.00000001d0
execute	mpexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0

Key	Value
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/dw10e-8/limiter
partition	test
threads	48
time	00:30:00
tmax	3546.258383607218d0
tout	443.28229795090225d0
xdmf_output	""

## Postprocessing configuration templates

### Task 1

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/longwave_basin.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48

### Task 2

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/longwave_basin.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s dry_tolerance

## Expanded computation jobs

### Job 1 (6397b0f5): Run 1 using Build 1 (6276513f)

Key	Value
courant	0.2d0
dmax	15
dmin	15
dry_tolerance	0.01d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	longwave_basin/dw10e-2/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	3546.258383607218d0

<b>Key</b>	<b>Value</b>
tout	443.28229795090225d0
xdmf_output	““

### Job 2 (7e4218a6): Run 2 using Build 1 (6276513f)

<b>Key</b>	<b>Value</b>
courant	0.2d0
dmax	15
dmin	15
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	longwave_basin/dw10e-8/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	3546.258383607218d0
tout	443.28229795090225d0
xdmf_output	““

### Job 3 (bafb5f9a): Run 1 using Build 2 (78162e11)

<b>Key</b>	<b>Value</b>
courant	0.2d0
dmax	15
dmin	15
dry_tolerance	0.01d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	longwave_basin/dw10e-2/BJ_vertex
partition	test
threads	48
time	00:30:00
tmax	3546.258383607218d0
tout	443.28229795090225d0
xdmf_output	““

### Job 4 (7c2ce8fe): Run 2 using Build 2 (78162e11)

Key	Value
courant	0.2d0
dmax	15
dmin	15
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	longwave_basin/dw10e-8/BJ_vertex
partition	test
threads	48
time	00:30:00
tmax	3546.258383607218d0
tout	443.28229795090225d0
xmf_output	""

## Expanded postprocessing calls

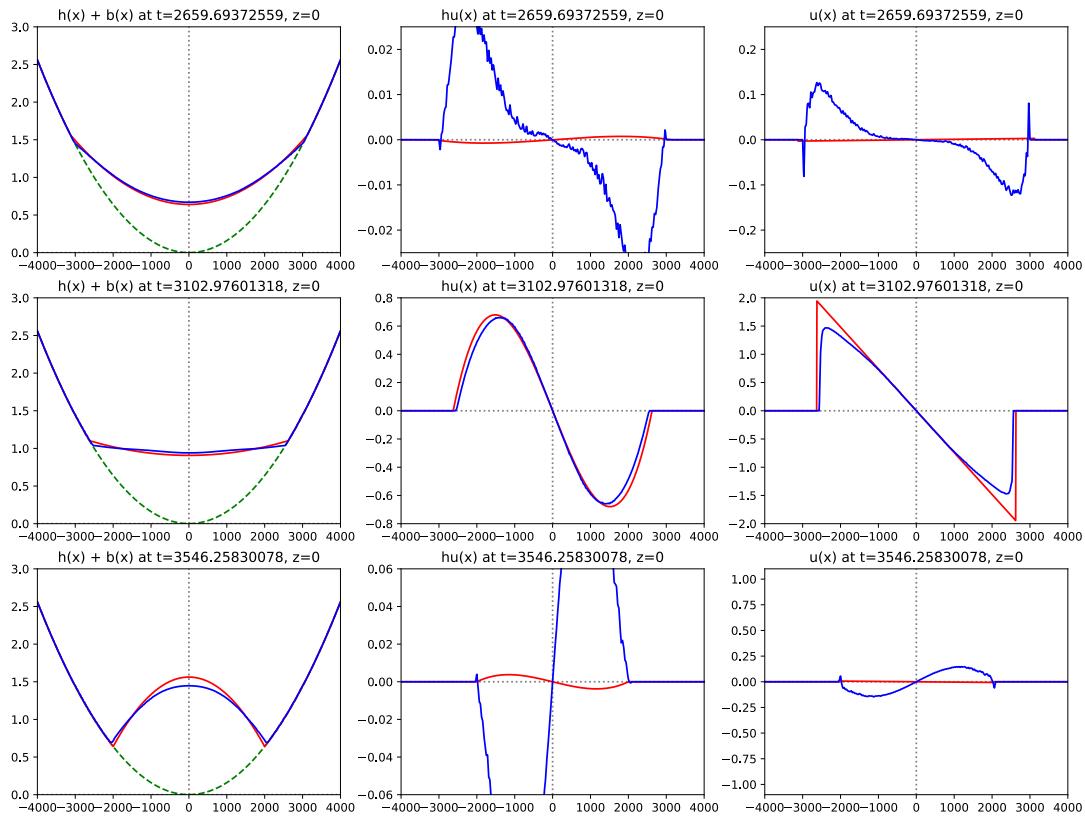
Process 1 (66094755): Task 1 using Job 1 (6397b0f5)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/longwave_basin.py -i `find "/opt/samoa/output/longwave_basin/dw10e-2/BJ_edge/" -type f -name '* .xmf'` -o \$CACHE/results/longwave_basin/dw10e-2/BJ_edge -n 48

## Results

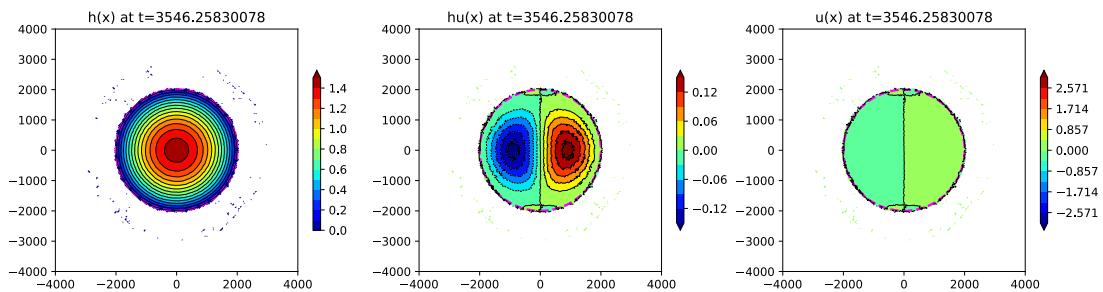
/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-2/BJ\_edge/anacomp.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881$ s  
 Comparison to exact solution at  $z=0$ ,  $t=1.5P$ ,  $1.75P$ ,  $2P$



/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-2/BJ\_edge/contour.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881$ s  
 Top-down contour plots at  $t=2P$ , dry/wet tolerance=0.01



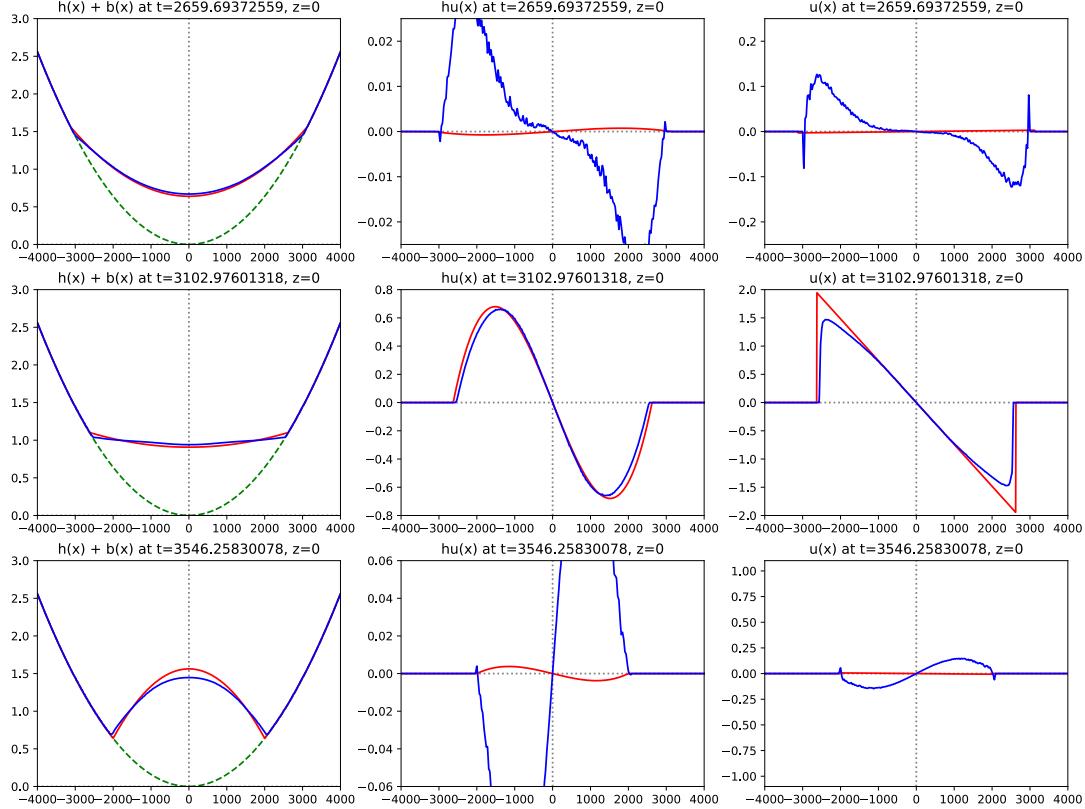
## Process 2 (55b6aa57): Task 2 using Job 1 (6397b0f5)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../../../post/longwave_basin.py -i `find "/opt/samoa/output/longwave_basin/dw10e-2/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/longwave_basin/dw10e-2/BJ_edge -n 48 -s 0.01d0

## Results

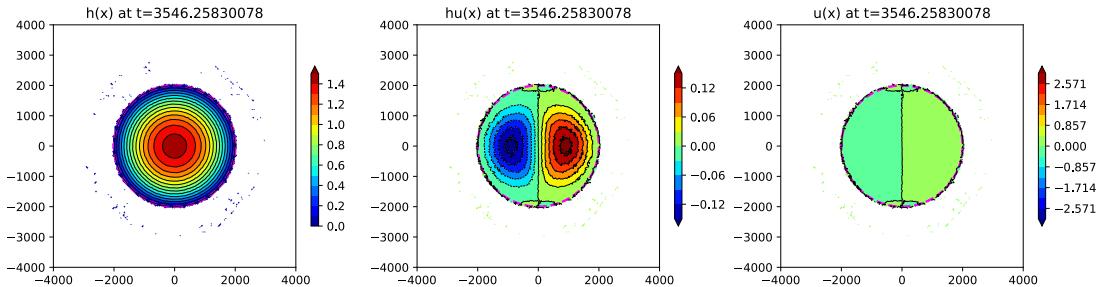
/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-2/BJ\_edge/anacomp.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881s$   
Comparison to exact solution at  $z=0, t=1.5P, 1.75P, 2P$



/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-2/BJ\_edge/contour.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881s$   
Top-down contour plots at  $t=2P$ , dry/wet tolerance=0.01



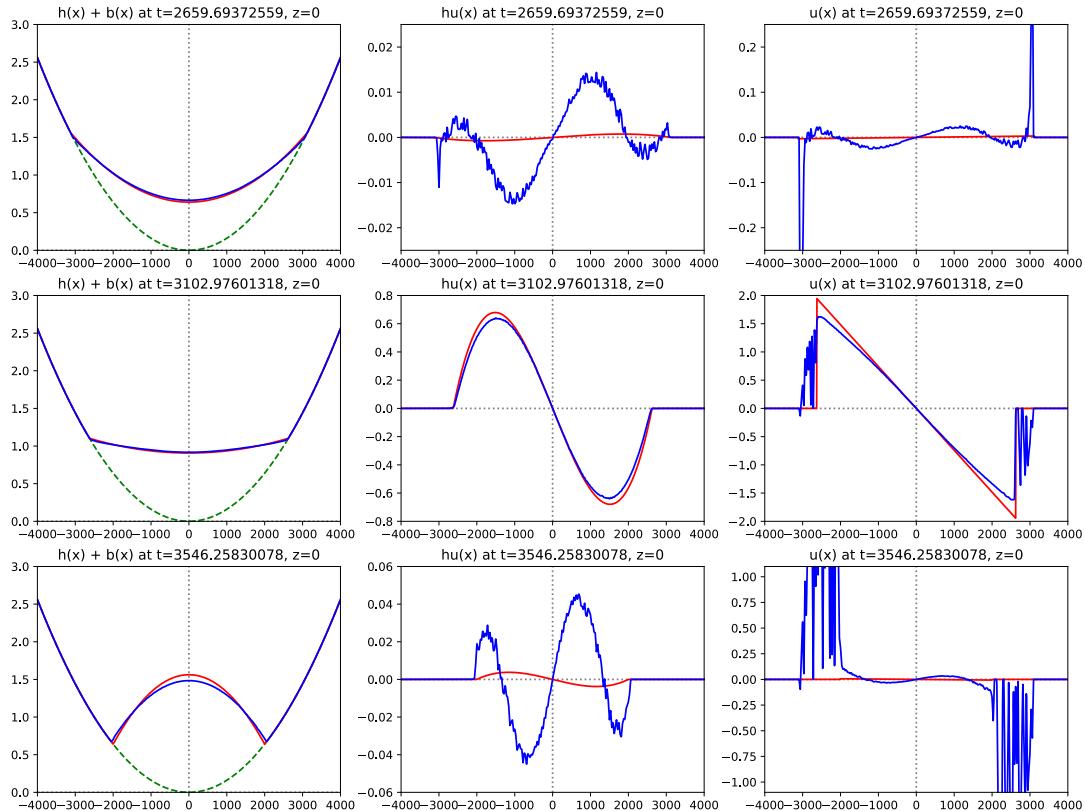
Process 3 (7bd56eb0): Task 1 using Job 2 (7e4218a6)

Key	Value
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/longwave_basin.py -i `find "/opt/samoa/output/longwave_basin/dw10e-8/BJ_edge/" -type f -name '* .xmf'` -o \$CACHE/results/longwave_basin/dw10e-8/BJ_edge -n 48

## Results

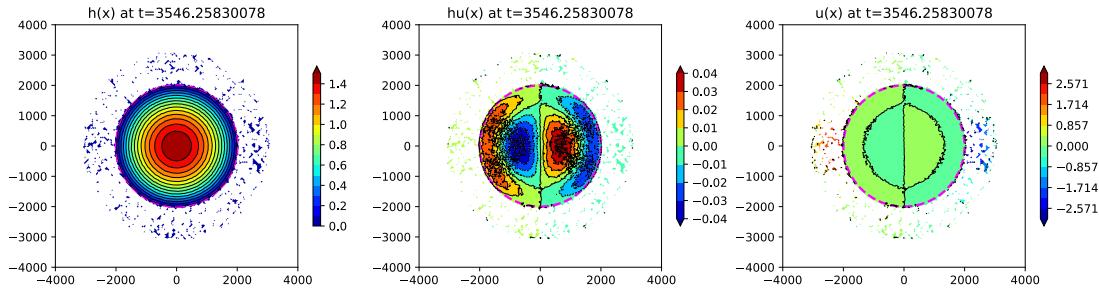
/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-8/BJ\_edge/anacomp.svg

Long wave resonance in a paraboloid basin, P=1773.4763281780881s  
Comparison to exact solution at z=0, t=1.5P, 1.75P, 2P



/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-8/BJ\_edge/contour.svg

Long wave resonance in a paraboloid basin, P=1773.4763281780881s  
 Top-down contour plots at t=2P, dry/wet tolerance=1e-08



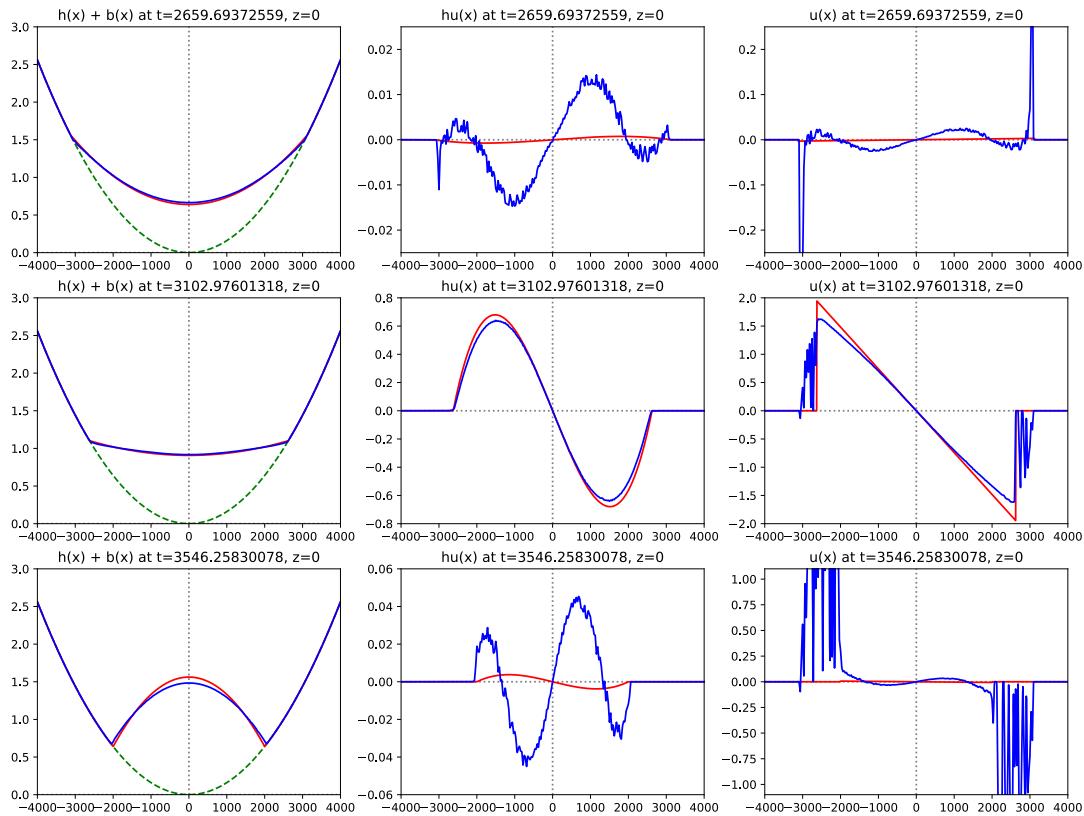
## Process 4 (e9f2f66d): Task 2 using Job 2 (7e4218a6)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/longwave_basin.py -i `find "/opt/samoa/output/longwave_basin/dw10e-8/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/longwave_basin/dw10e-8/BJ_edge -n 48 -s 0.00000001d0

## Results

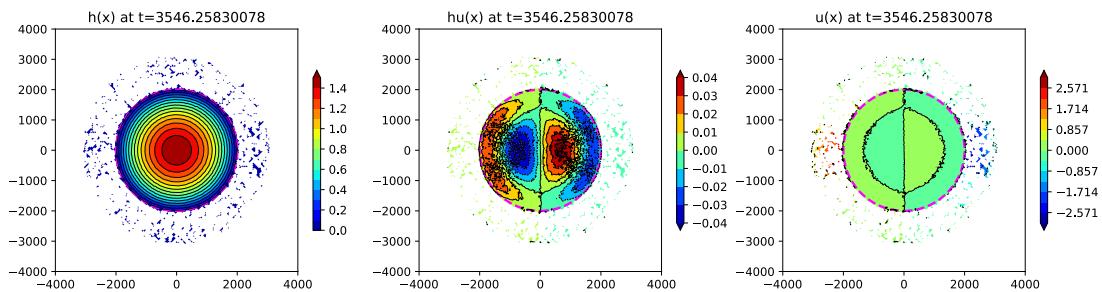
/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-8/BJ\_edge/anacomp.svg

Long wave resonance in a paraboloid basin, P=1773.4763281780881s  
 Comparison to exact solution at z=0, t=1.5P, 1.75P, 2P



/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-8/BJ\_edge/contour.svg

Long wave resonance in a paraboloid basin, P=1773.4763281780881s  
 Top-down contour plots at t=2P, dry/wet tolerance=1e-08



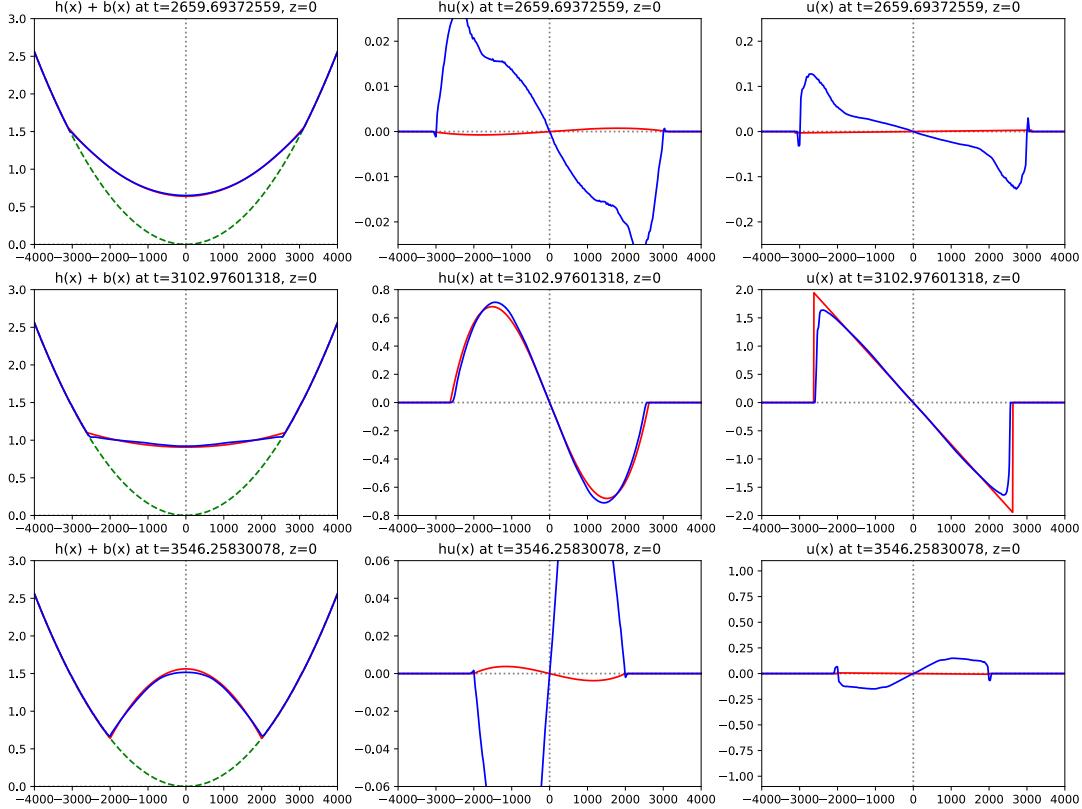
## Process 5 (d7d192c3): Task 1 using Job 3 (bafb5f9a)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../../../post/longwave_basin.py -i `find "/opt/samoa/output/longwave_basin/dw10e-2/BJ_vertex/" -type f -name '*.xmf'` -o \$CACHE/results/longwave_basin/dw10e-2/BJ_vertex -n 48

## Results

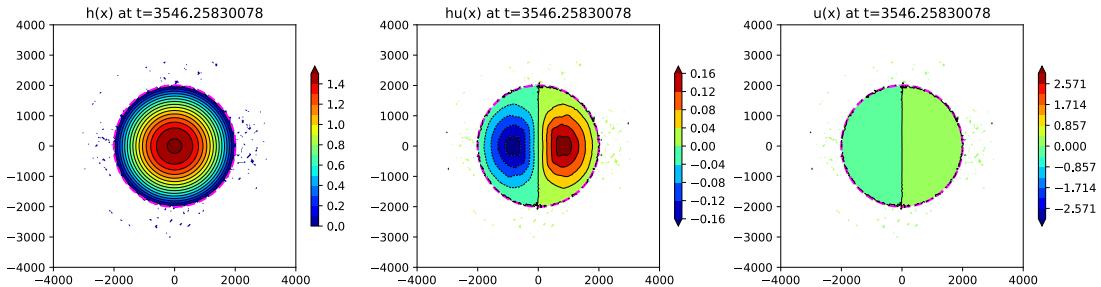
/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-2/BJ\_vertex/anacomp.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881s$   
Comparison to exact solution at  $z=0, t=1.5P, 1.75P, 2P$



/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-2/BJ\_vertex/contour.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881s$   
Top-down contour plots at  $t=2P$ , dry/wet tolerance=0.01



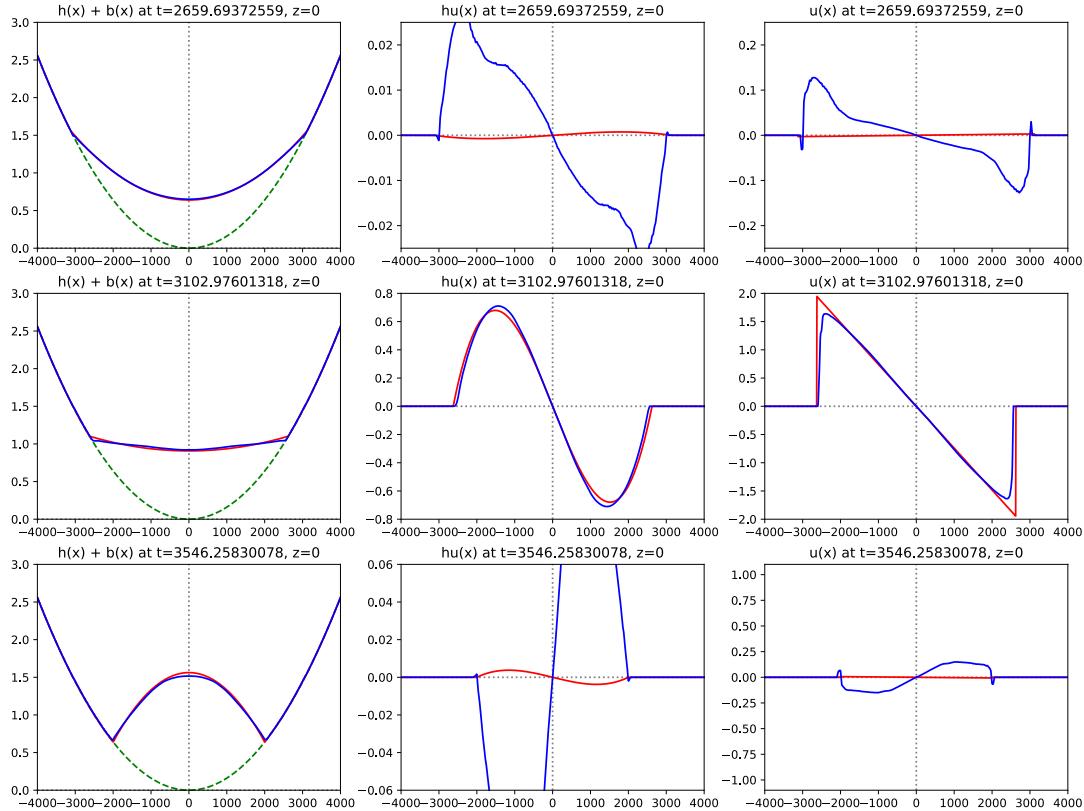
Process 6 (ed3b6ac0): Task 2 using Job 3 (bafb5f9a)

Key	Value
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/longwave_basin.py -i `find "/opt/samoa/output/longwave_basin/dw10e-2/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/longwave_basin/dw10e-2/BJ_vertex -n 48 -s 0.01d0

## Results

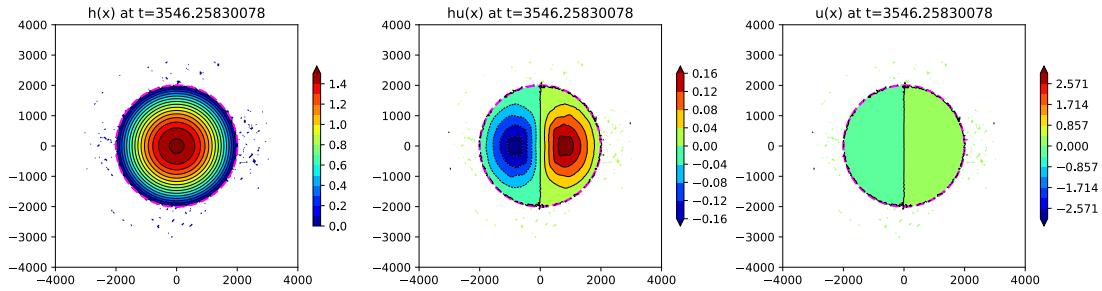
/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-2/BJ\_vertex/anacomp.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881s$   
Comparison to exact solution at  $z=0$ ,  $t=1.5P, 1.75P, 2P$



/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-2/BJ\_vertex/contour.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881$   
 Top-down contour plots at  $t=2P$ , dry/wet tolerance=0.01



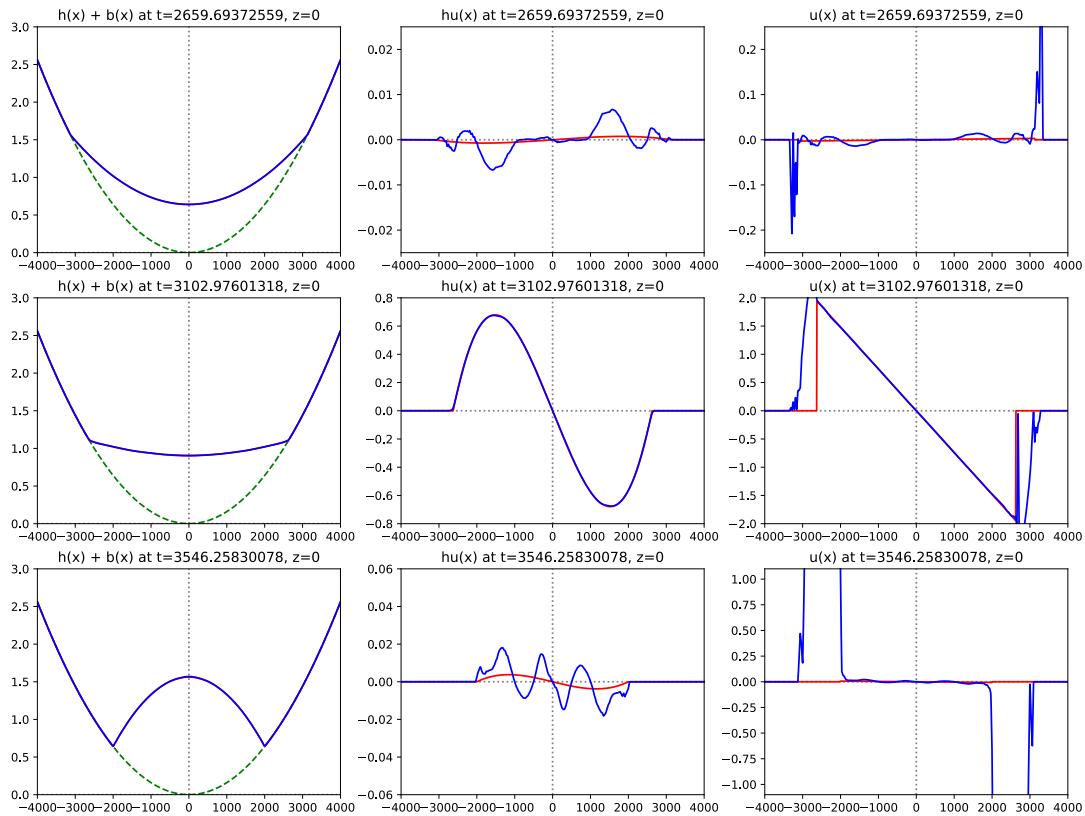
## Process 7 (be4da77a): Task 1 using Job 4 (7c2ce8fe)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/longwave_basin.py -i `find "/opt/samoa/output/longwave_basin/dw10e-8/BJ_vertex/" -type f -name '*.xmf'` -o \$CACHE/results/longwave_basin/dw10e-8/BJ_vertex -n 48

## Results

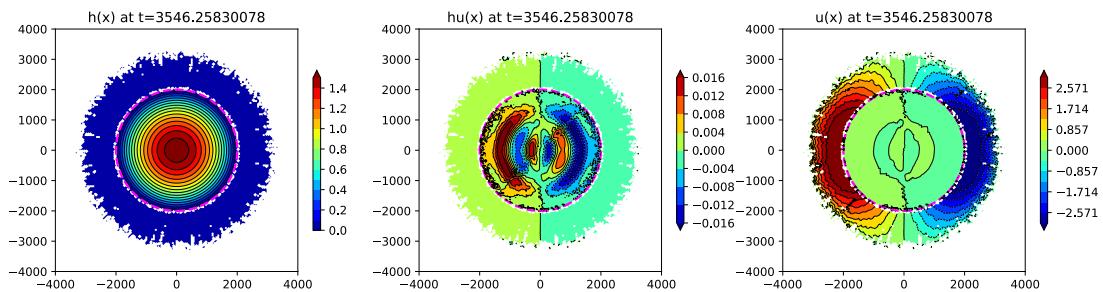
/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-8/BJ\_vertex/anacomp.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881$ s  
 Comparison to exact solution at  $z=0$ ,  $t=1.5P$ ,  $1.75P$ ,  $2P$



/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-8/BJ\_vertex/contour.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881$ s  
 Top-down contour plots at  $t=2P$ , dry/wet tolerance= $1e-08$



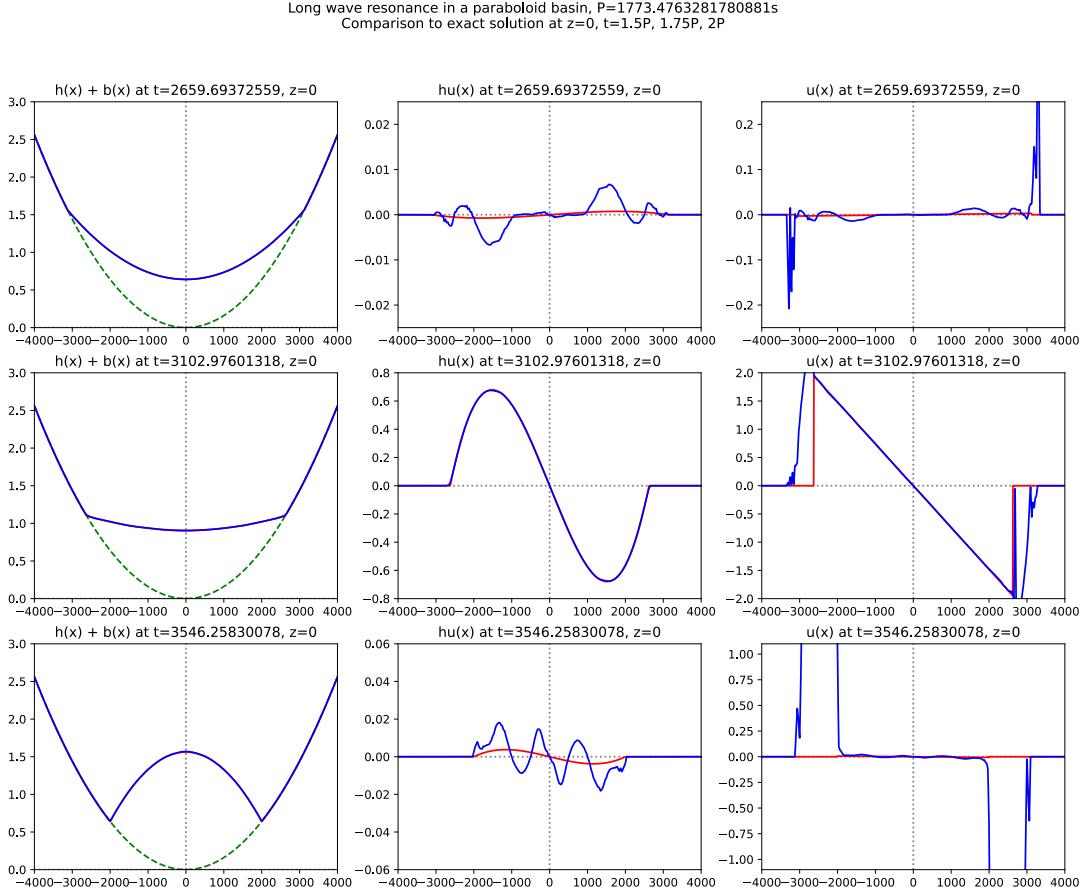
Process 8 (a13afb43): Task 2 using Job 4 (7c2ce8fe)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios

Key	Value
execute	<pre>./../post/longwave_basin.py -i `find "/opt/samoa/output/longwave_basin/dw10e-8/BJ_vertex/" -type f -name '*.*mf'` -o \$CACHE/results/longwave_basin/dw10e-8/BJ_vertex -n 48 -s 0.00000001d0</pre>

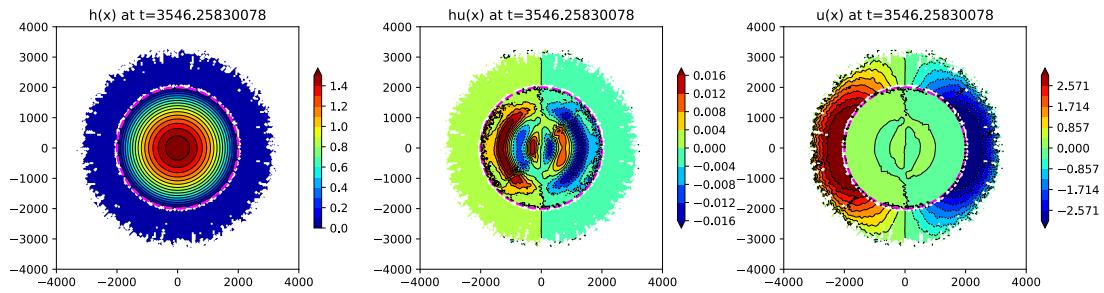
## Results

/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-8/BJ\_vertex/anacomp.svg



/opt/samoa/time-to-solution/flash/results/longwave\_basin/dw10e-8/BJ\_vertex/contour.svg

Long wave resonance in a paraboloid basin,  $P=1773.4763281780881$   
Top-down contour plots at  $t=2P$ , dry/wet tolerance= $1e-08$



# Chapter 6

## Scenario 4.4: Oscillatory flow in a parabolic bowl

### Notes

The refinement level 12 was chosen, which results in  $64*64*2$  elements - the same as in [1]: see section 4.4, paragraph two.

The dry/wet tolerance of  $10e-3$  was directly taken from [1].

The courant number of 0.3 was found by experimentation. The average computation time step size is about 0.002218 seconds, while the fixed time step size in [1] is 0.004487 seconds.

The datasets only contain the timesteps at  $t = n * (P / 1000)$  from  $t = 0$  up to  $t = 2P$  to save space.

A series of runs are made for refinement levels 10 to 18, and written only at  $t = 2P$ .

### Evaluation

A z-cross-section is interpolated at  $z = 0$  and plotted for all relevant variables, and compared to the analytical solution at  $t = 2P$ . These results can then be compared with [1], see figure 11.

Contour plots at  $t = 2P$  are generated for the full domain. These results can then be compared with [1], see figure 12.

A limiter error series is plotted for different refinement levels. These results can then be compared with [1], see figure 14.

Mass and energy errors are calculated and plotted over time. These results can then be compared with [1], see figure 15.

### Configuration sources

- File: `configs/machines/supermuc/config.json`
- File: `configs/flash.json`
- File: `configs/scenarios/oscillating_lake_fat.json`
- Inline: `{"samoa_dir": ".../samoa-flash", "cache_dir": "/opt/samoa/time-to-solution/flash", "run": {"output_base": "/opt/samoa/output"}}`

## Build configuration templates

### Build 1 (379cd7a0)

Key	Value
asagi	false
flash_order	1
limiter	BJ_edge
scenario	flash
swe_scenario	oscillating_lake

### Build 2 (1e8479ed)

Key	Value
asagi	false
flash_order	1
limiter	BJ_vertex
scenario	flash
swe_scenario	oscillating_lake

## Run configuration templates

### Run 1

Key	Value
courant	0.3d0
dmax	12
dmin	12
dry_tolerance	0.001d0
execute	mpexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/fat/limiter
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	0.00448571d0
xdmf_output	""

## Postprocessing configuration templates

### Task 1

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/oscillating_lake.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48

## Task 2

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/oscillating_lake.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s dry_tolerance

## Task 3

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/oscillating_lake.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s mass

## Task 4

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/oscillating_lake.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s energy

## Expanded computation jobs

### Job 1 (97e37d83): Run 1 using Build 1 (379cd7a0)

Key	Value
courant	0.3d0
dmax	12
dmin	12
dry_tolerance	0.001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/fat/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	0.00448571d0

Key	Value
xdmf_output	""

### Job 2 (9b77df4f): Run 1 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	12
dmin	12
dry_tolerance	0.001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/fat/BJ_vertex
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	0.00448571d0
xdmf_output	""

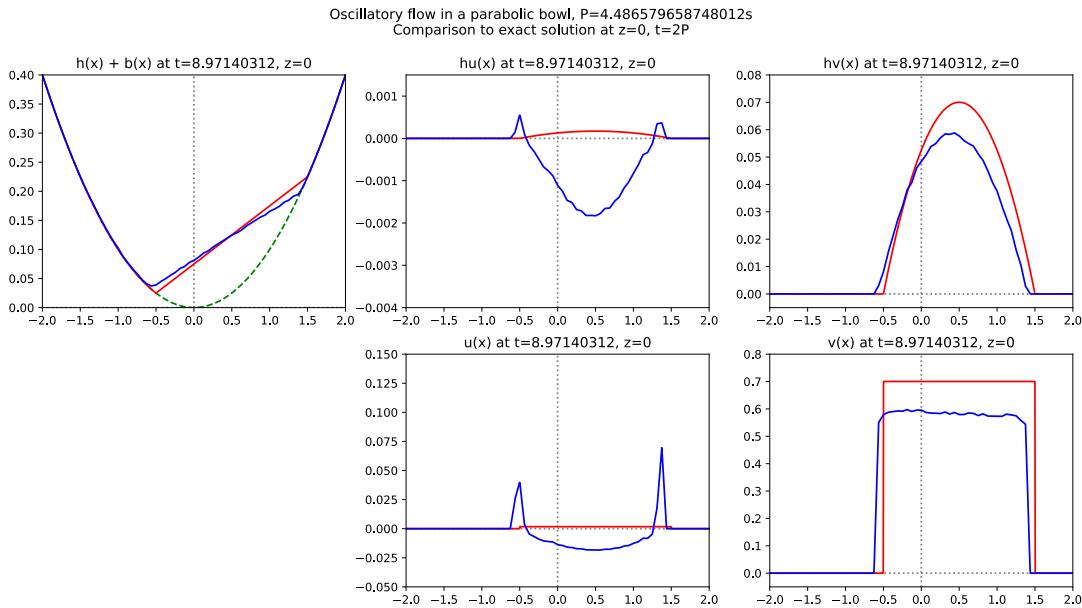
## Expanded postprocessing calls

### Process 1 (0bfd6bc8): Task 1 using Job 1 (97e37d83)

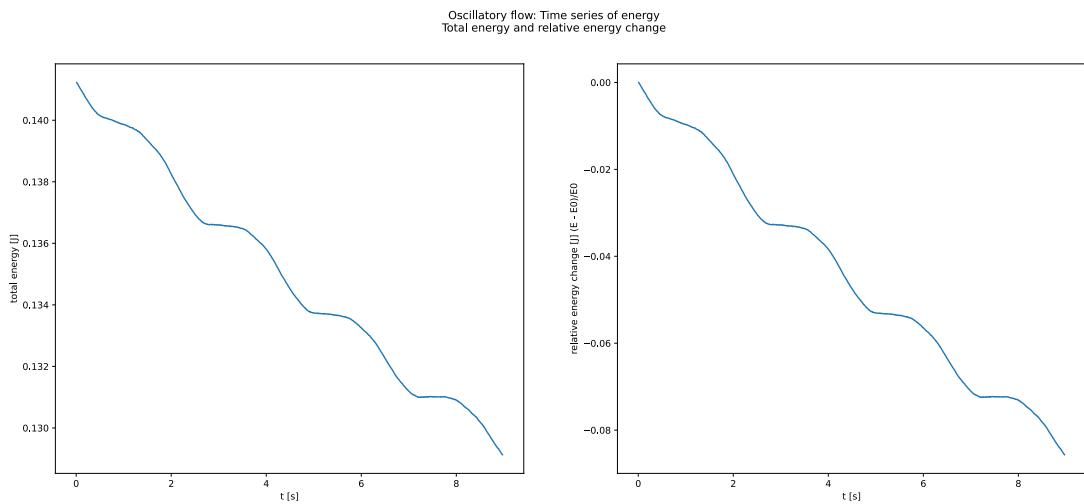
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/oscillating_lake.py -i `find "/opt/samoa/output/oscillating_lake/fat/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/oscillating_lake/fat/BJ_edge -n 48

## Results

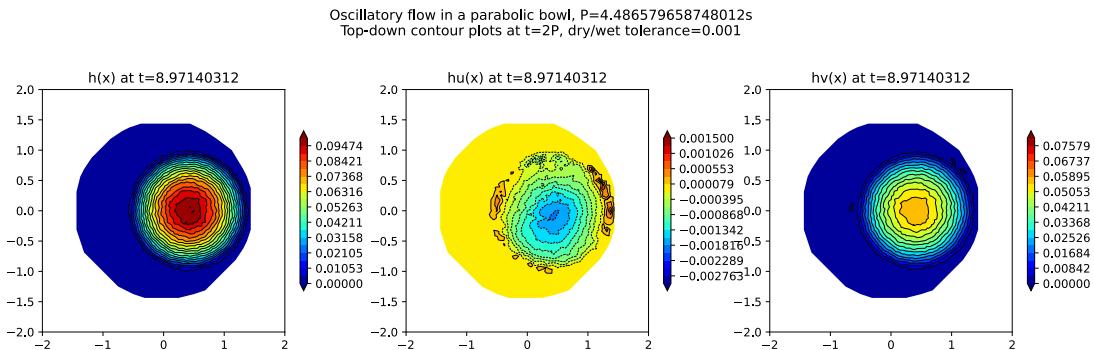
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/anacomp.svg



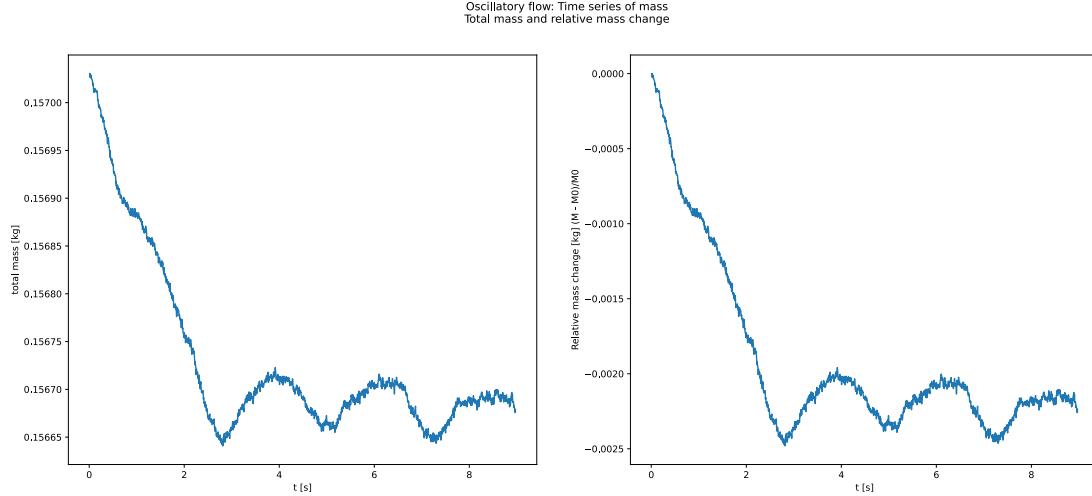
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/energy.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/contour.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/mass.svg

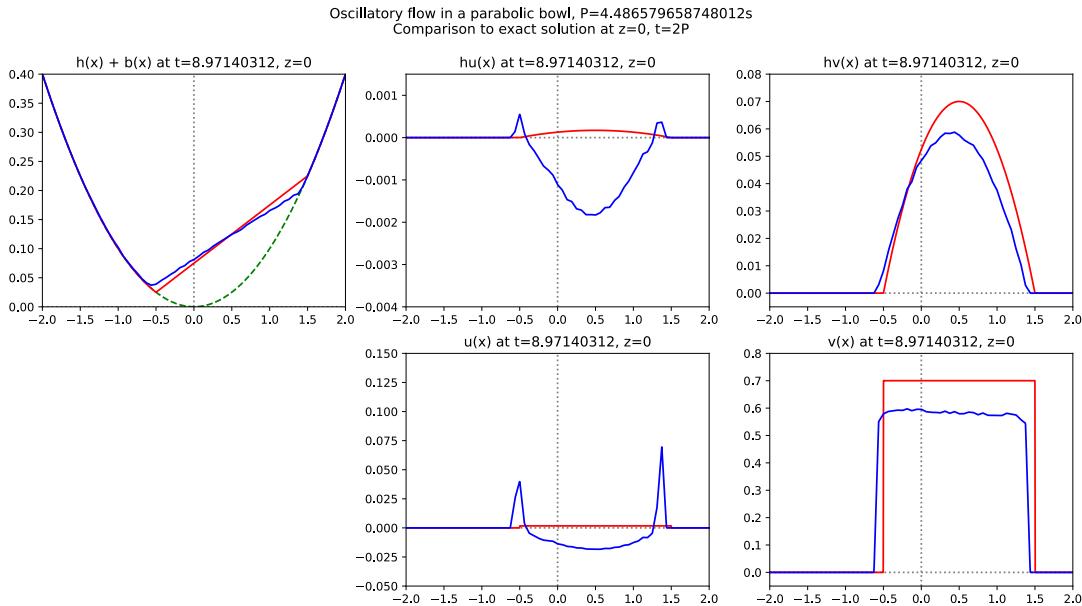


## Process 2 (2069a50f): Task 2 using Job 1 (97e37d83)

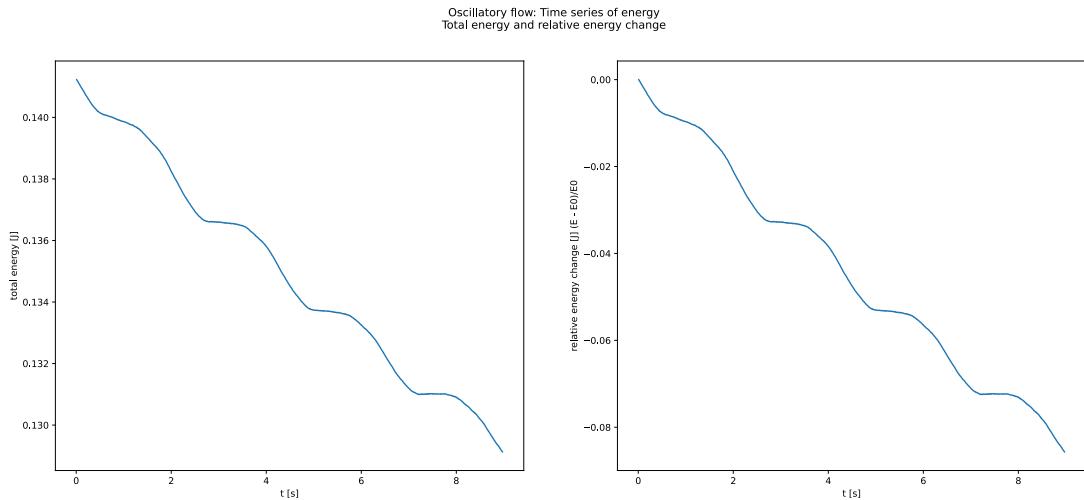
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../post/oscillating_lake.py -i `find "/opt/samoa/output/oscillating_lake/fat/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/oscillating_lake/fat/BJ_edge -n 48 -s 0.001d0

## Results

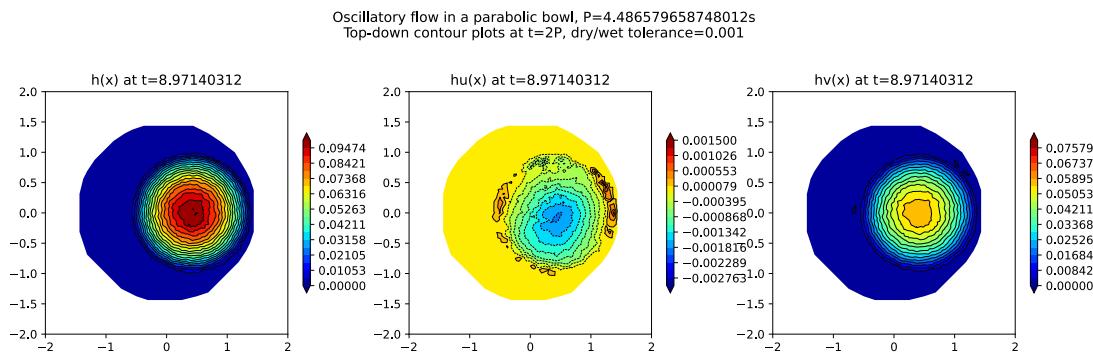
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/anacomp.svg



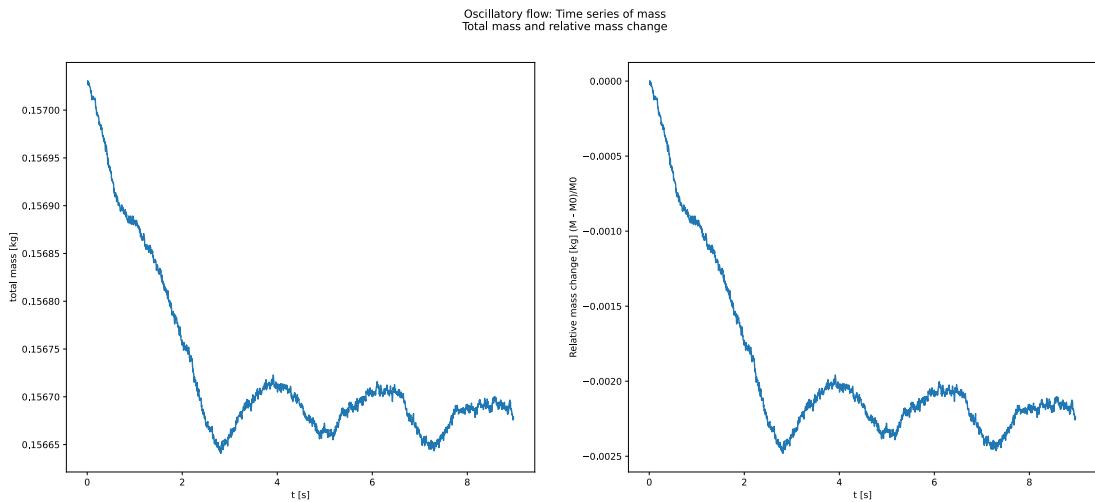
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/energy.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/contour.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/mass.svg

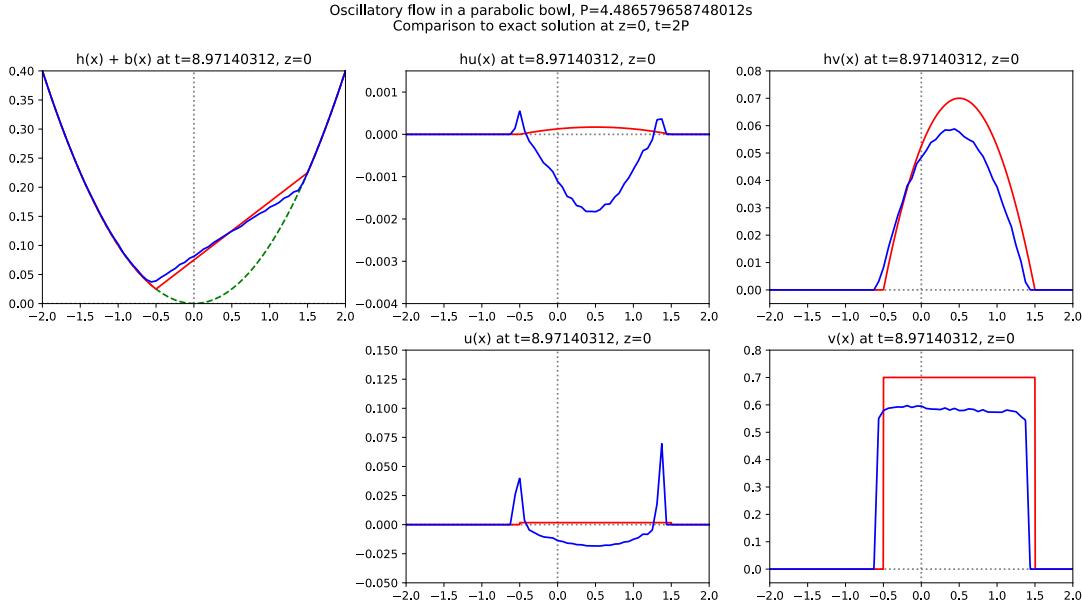


**Process 3 (8c5f9ede): Task 3 using Job 1 (97e37d83)**

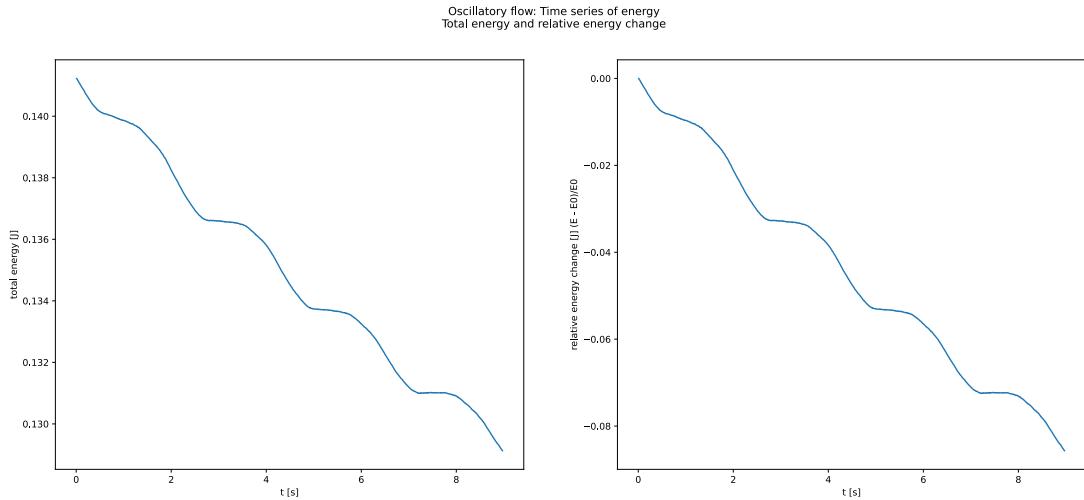
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/oscillating_lake.py -i `find "/opt/samoa/output/oscillating_lake/fat/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/oscillating_lake/fat/BJ_edge -n 48 -s mass

## Results

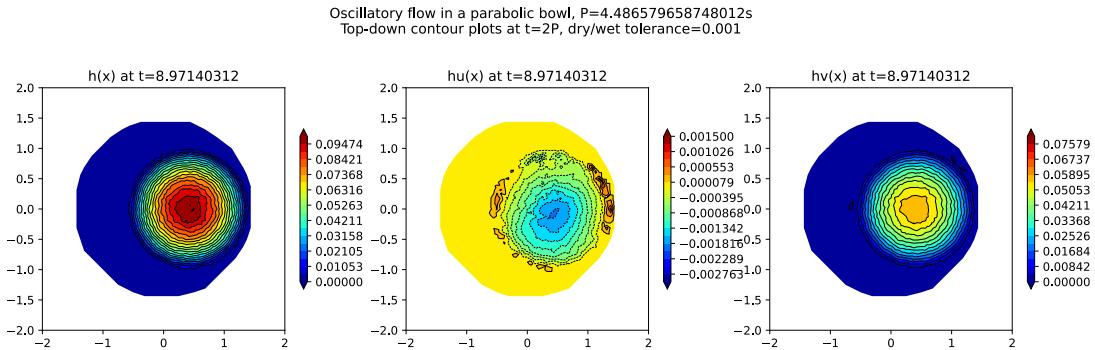
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/anacomp.svg



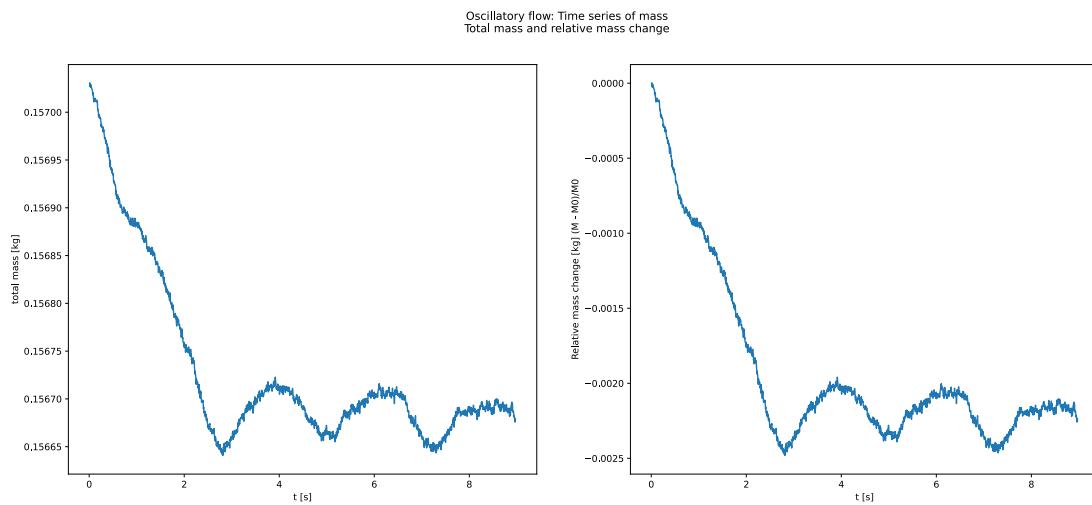
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/energy.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/contour.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/mass.svg

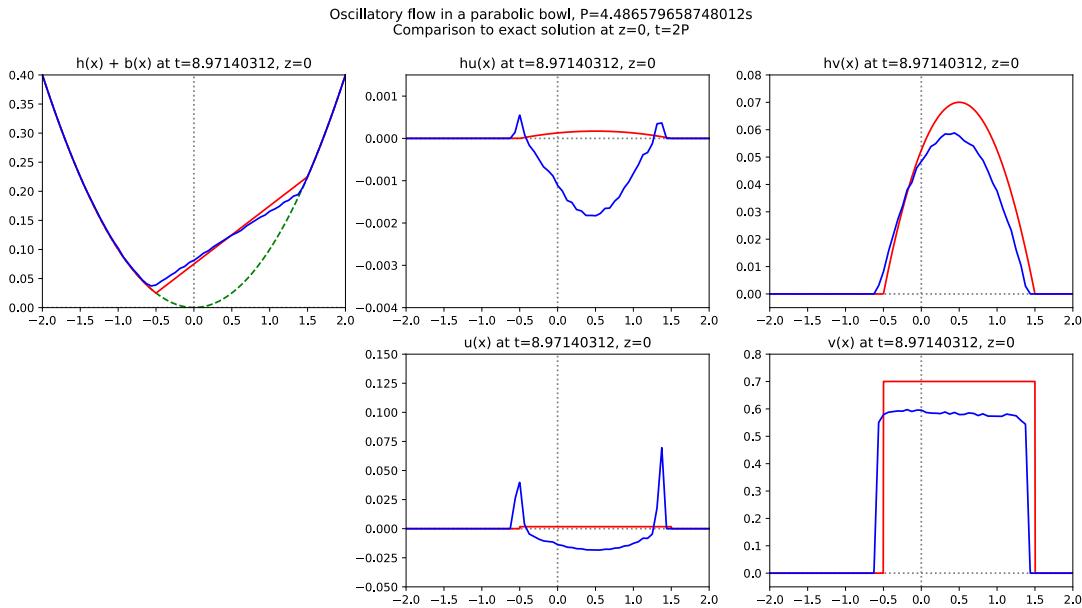


### Process 4 (7d8f25af): Task 4 using Job 1 (97e37d83)

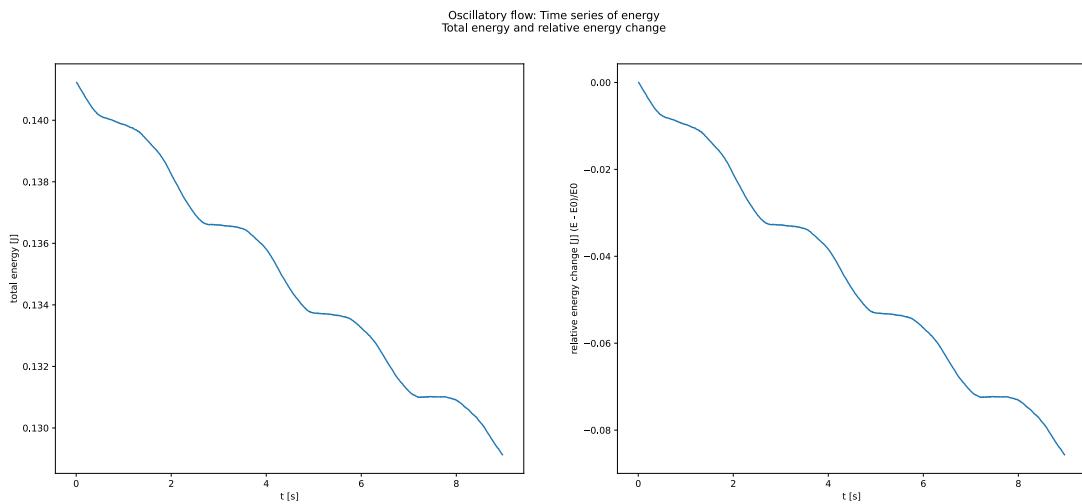
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/oscillating_lake.py -i `find "/opt/samoa/output/oscillating_lake/fat/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/oscillating_lake/fat/BJ_edge -n 48 -s energy

### Results

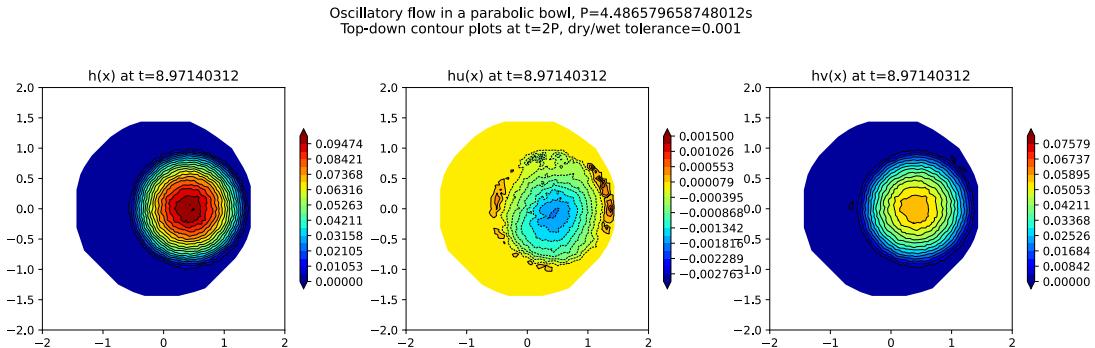
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/anacomp.svg



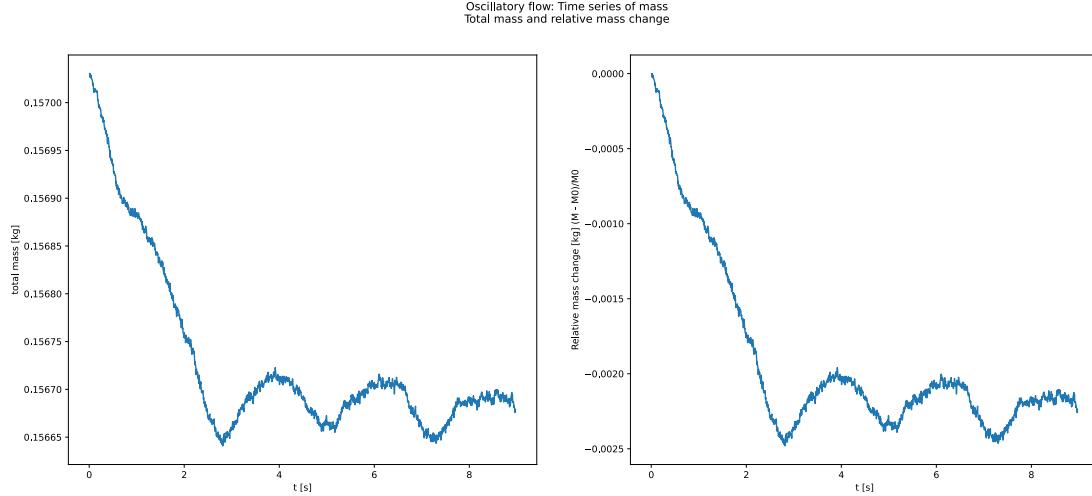
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/energy.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/contour.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_edge/mass.svg

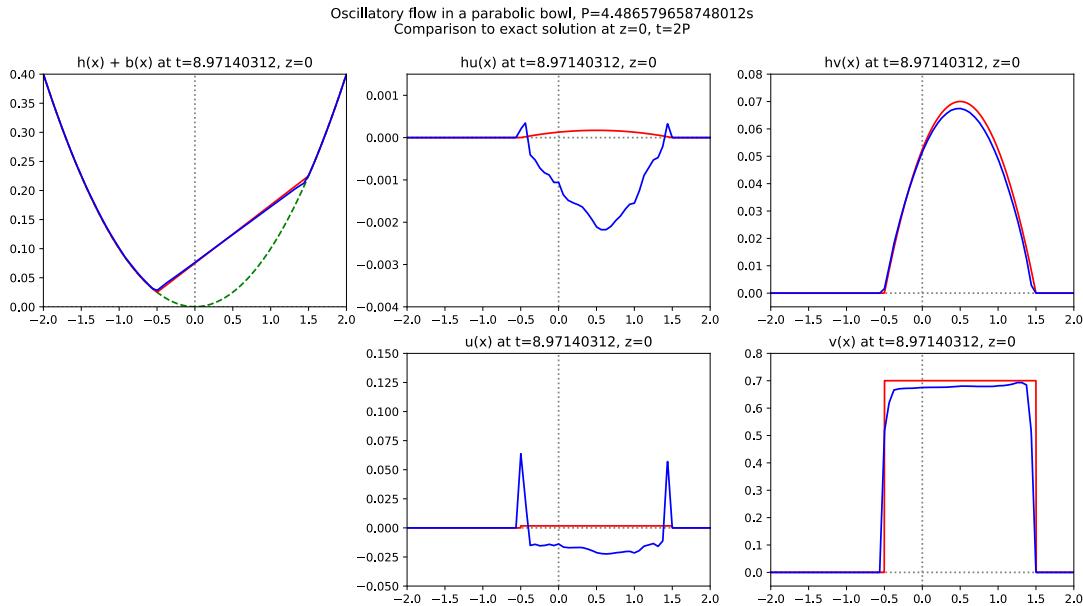


## Process 5 (36d37aa9): Task 1 using Job 2 (9b77df4f)

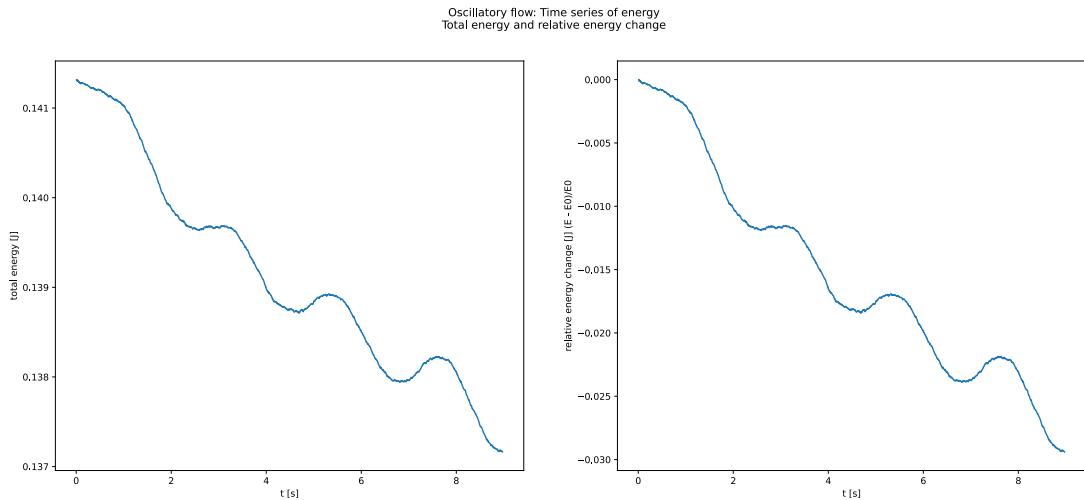
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../post/oscillating_lake.py -i `find "/opt/samoa/output/oscillating_lake/fat/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/oscillating_lake/fat/BJ_vertex -n 48

## Results

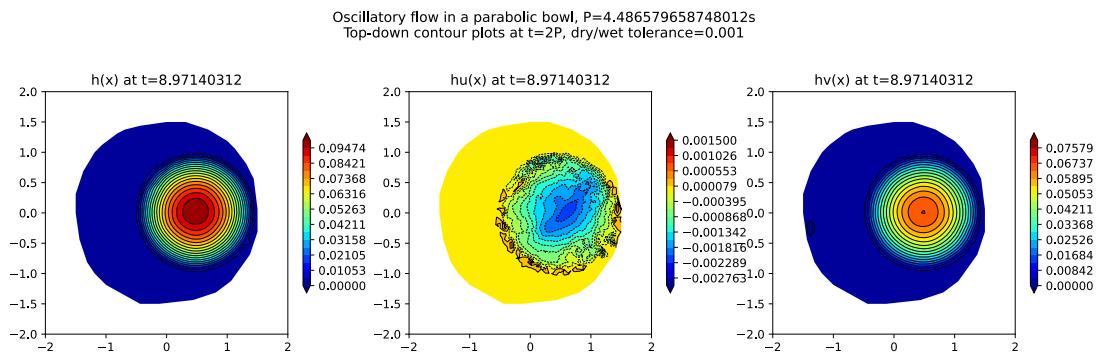
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/anacomp.svg



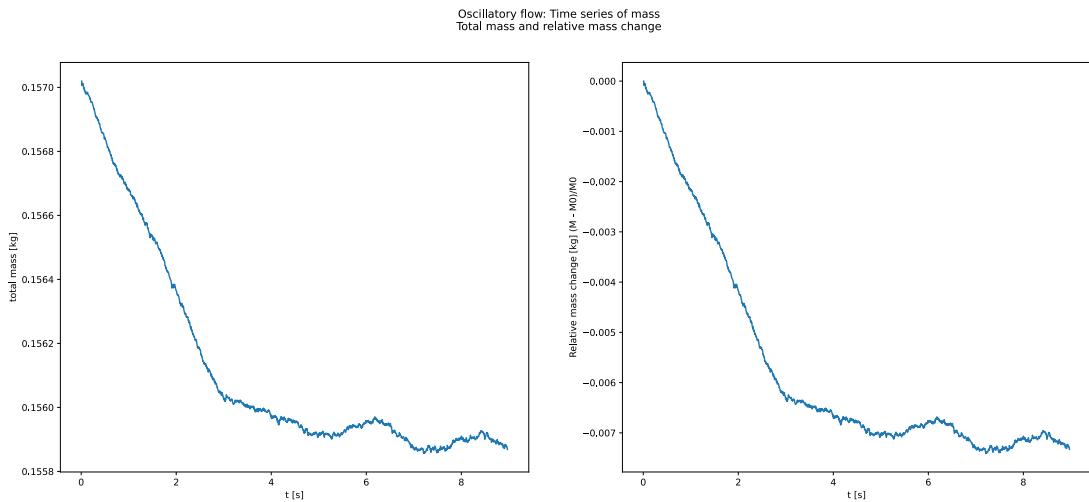
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/energy.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/contour.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/mass.svg

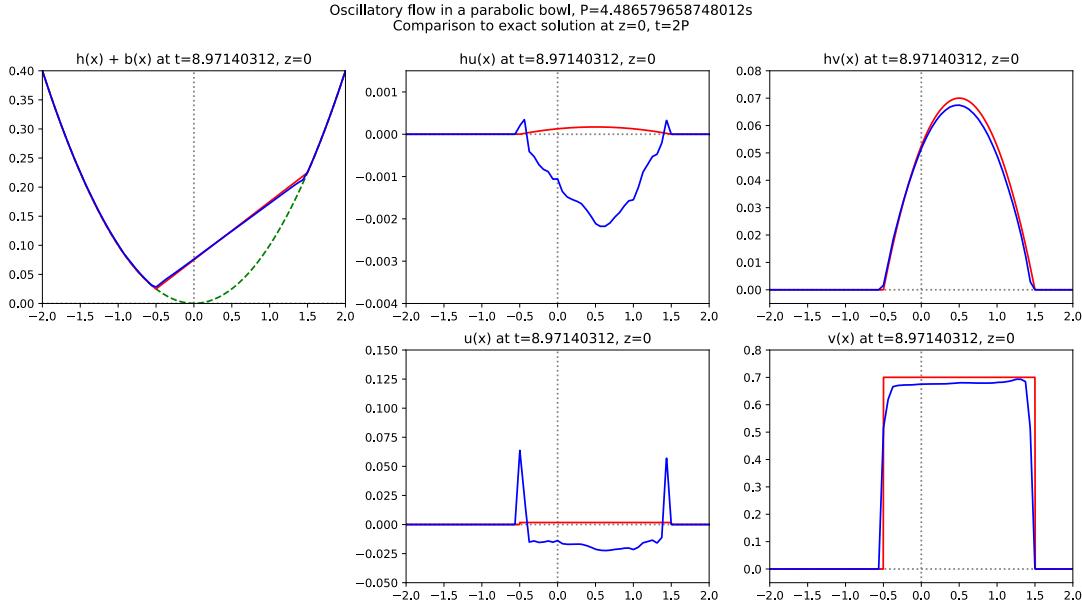


**Process 6 (0c170dd4): Task 2 using Job 2 (9b77df4f)**

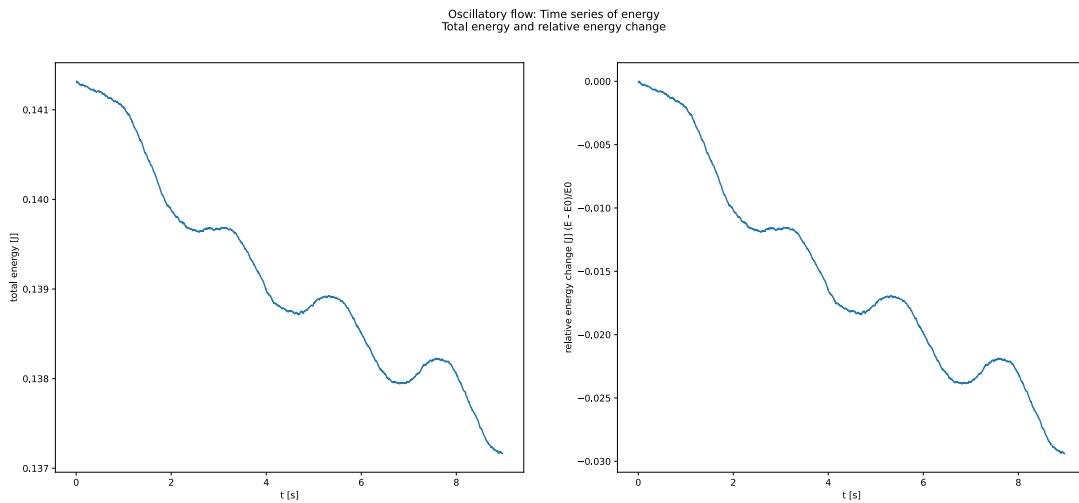
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	./.../post/oscillating_lake.py -i `find "/opt/samoa/output/oscillating_lake/fat/BJ_vertex/" -type f -name '*.*mf'` -o \$CACHE/results/oscillating_lake/fat/BJ_vertex -n 48 -s 0.001d0

## Results

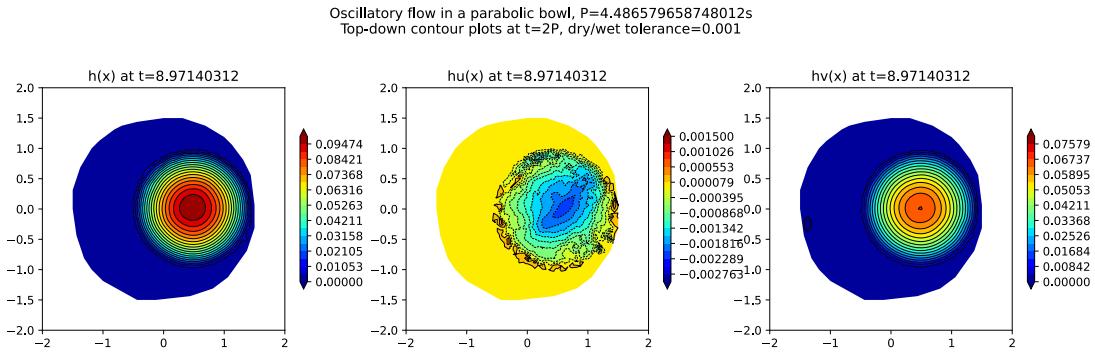
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/anacomp.svg



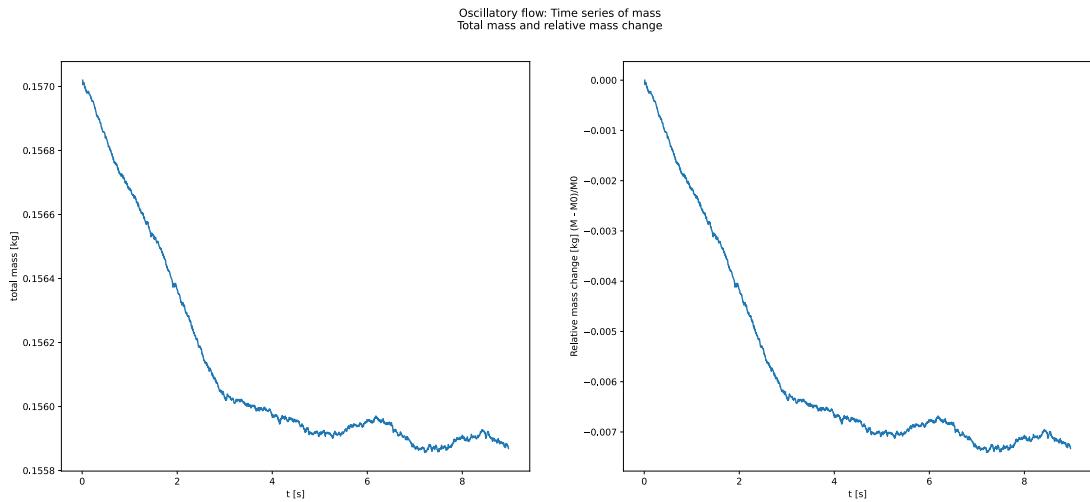
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/energy.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/contour.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/mass.svg



## Process 7 (b3bc4330): Task 3 using Job 2 (9b77df4f)

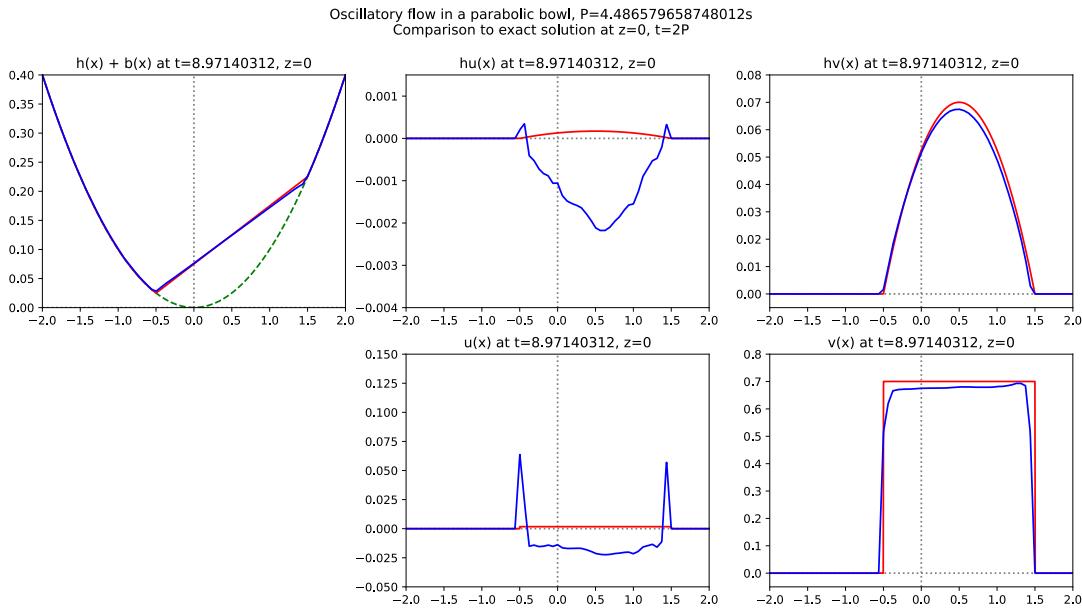
---

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/oscillating_lake.py -i `find "/opt/samoa/output/oscillating_lake/fat/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/oscillating_lake/fat/BJ_vertex -n 48 -s mass

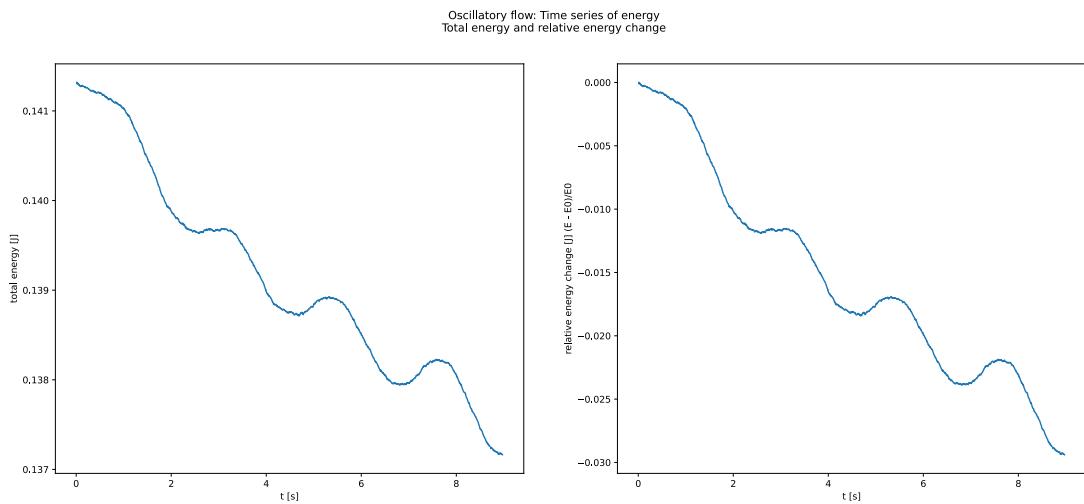
---

## Results

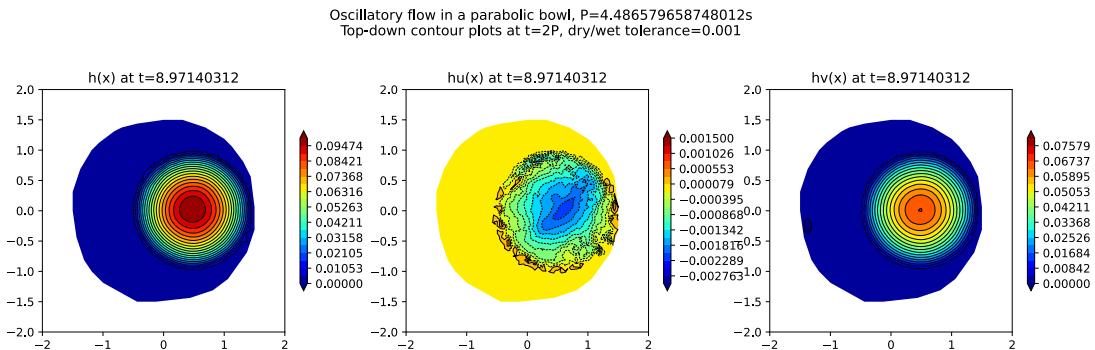
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/anacomp.svg



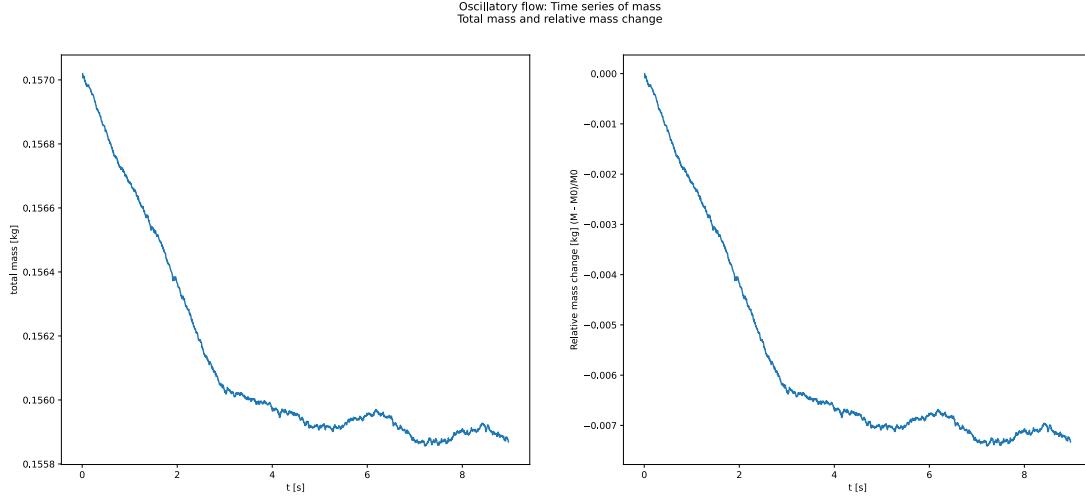
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/energy.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/contour.svg



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/mass.svg

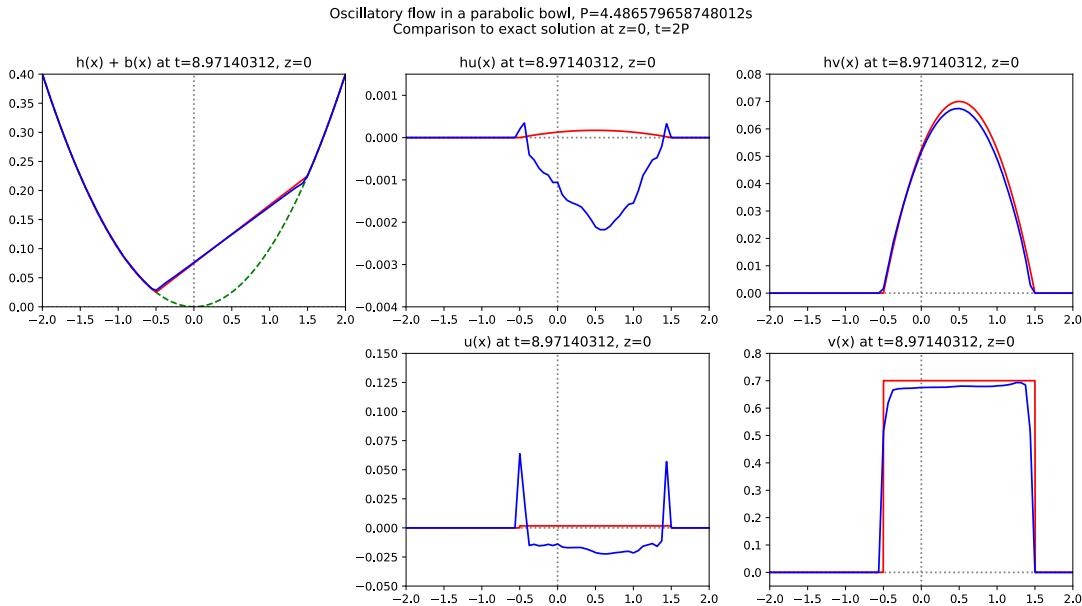


## Process 8 (3dd18f9c): Task 4 using Job 2 (9b77df4f)

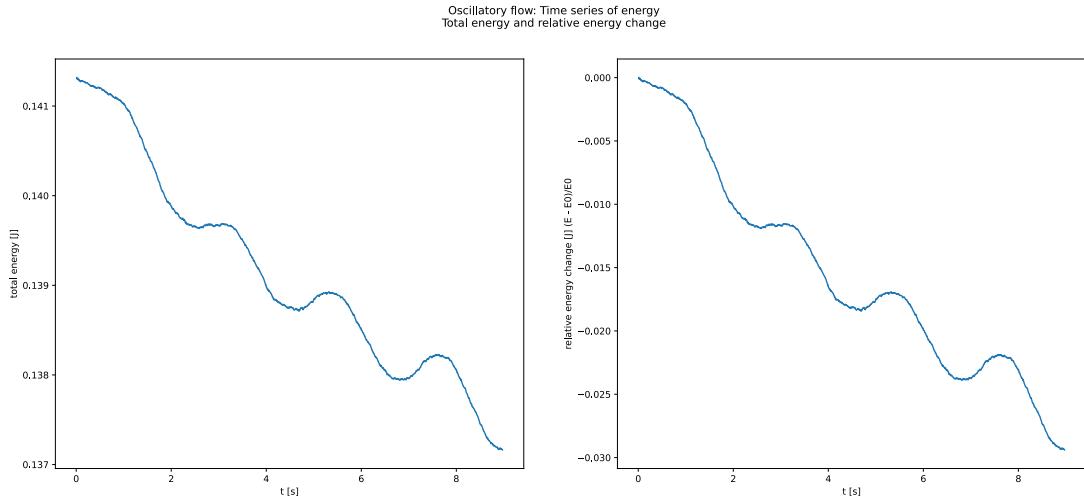
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../post/oscillating_lake.py -i `find "/opt/samoa/output/oscillating_lake/fat/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/oscillating_lake/fat/BJ_vertex -n 48 -s energy

## Results

/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/anacomp.svg

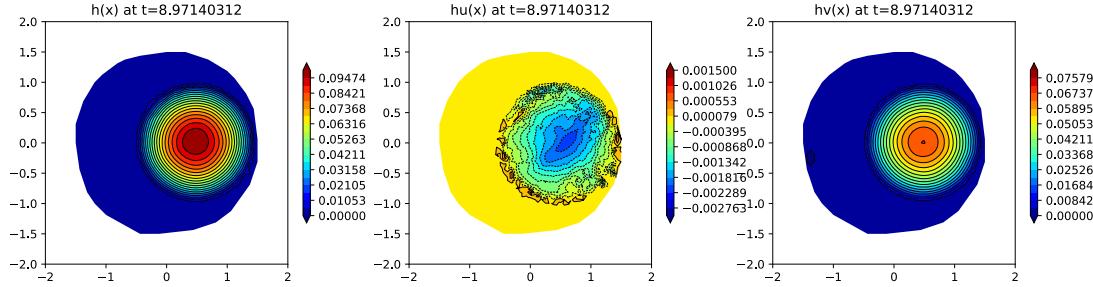


/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/energy.svg



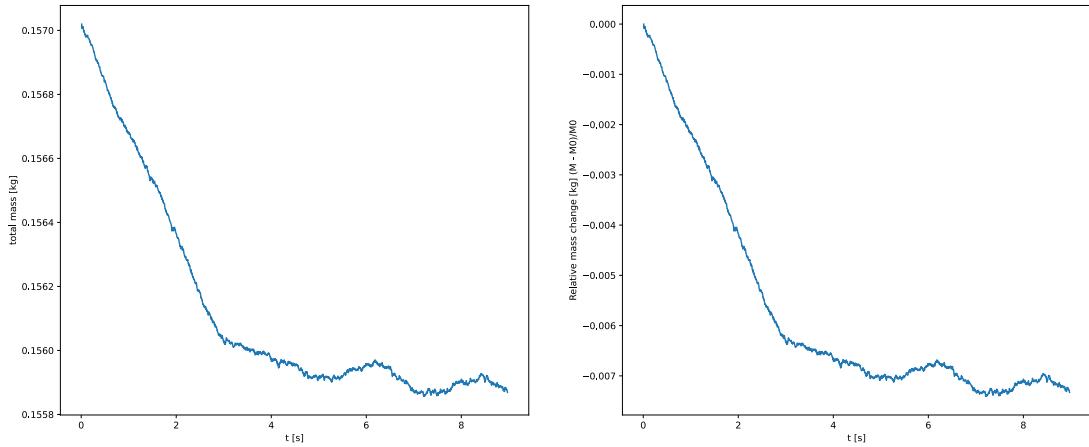
/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/contour.svg

Oscillatory flow in a parabolic bowl,  $P=4.4865796587480125$   
Top-down contour plots at  $t=2P$ , dry/wet tolerance=0.001



/opt/samoa/time-to-solution/flash/results/oscillating\_lake/fat/BJ\_vertex/mass.svg

Oscillatory flow: Time series of mass  
Total mass and relative mass change



## Configuration sources

- File: `configs/machines/supermuc/config.json`

- File: `configs/flash.json`
- File: `configs/scenarios/oscillating_lake_series.json`
- Inline: `{"samoa_dir": ".../samoa-flash", "cache_dir": "/opt/samoa/time-to-solution/flash", "run": {"output_base": "/opt/samoa/output"}}`

## Build configuration templates

### Build 1 (379cd7a0)

Key	Value
asagi	false
flash_order	1
limiter	BJ_edge
scenario	flash
swe_scenario	oscillating_lake

### Build 2 (1e8479ed)

Key	Value
asagi	false
flash_order	1
limiter	BJ_vertex
scenario	flash
swe_scenario	oscillating_lake

## Run configuration templates

### Run 1

Key	Value
courant	0.3d0
dmax	10
dmin	10
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/10
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

## Run 2

Key	Value
courant	0.3d0
dmax	11
dmin	11
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/11
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

## Run 3

Key	Value
courant	0.3d0
dmax	12
dmin	12
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/12
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

## Run 4

Key	Value
courant	0.3d0
dmax	13
dmin	13
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0

<b>Key</b>	<b>Value</b>
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/13
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

## Run 5

<b>Key</b>	<b>Value</b>
courant	0.3d0
dmax	14
dmin	14
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/14
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

## Run 6

<b>Key</b>	<b>Value</b>
courant	0.3d0
dmax	15
dmin	15
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/15
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0

<b>Key</b>	<b>Value</b>
xdmf_output	""

## Run 7

<b>Key</b>	<b>Value</b>
courant	0.3d0
dmax	16
dmin	16
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/16
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

## Run 8

<b>Key</b>	<b>Value</b>
courant	0.3d0
dmax	17
dmin	17
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/17
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

## Run 9

<b>Key</b>	<b>Value</b>
courant	0.3d0
dmax	18

Key	Value
dmin	18
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	swe_scenario/series/limiter/18
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

## Postprocessing configuration templates

### Task 1

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute_once	./post/oscillating_lake.py -i output_base/swe_scenario/series/limiter -o \$CACHE/results/swe_scenario/series/limiter -s series

## Expanded computation jobs

### Job 1 (5b17ba57): Run 1 using Build 1 (379cd7a0)

Key	Value
courant	0.3d0
dmax	10
dmin	10
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/10
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

## Job 2 (b6ad89b8): Run 2 using Build 1 (379cd7a0)

Key	Value
courant	0.3d0
dmax	11
dmin	11
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/11
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

## Job 3 (d27befc1): Run 3 using Build 1 (379cd7a0)

Key	Value
courant	0.3d0
dmax	12
dmin	12
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/12
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

## Job 4 (d2adc956): Run 4 using Build 1 (379cd7a0)

Key	Value
courant	0.3d0
dmax	13
dmin	13
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute

Key	Value
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/13
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

### Job 5 (b8be58a9): Run 5 using Build 1 (379cd7a0)

Key	Value
courant	0.3d0
dmax	14
dmin	14
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/14
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

### Job 6 (87b151b9): Run 6 using Build 1 (379cd7a0)

Key	Value
courant	0.3d0
dmax	15
dmin	15
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/15
partition	test
threads	48
time	00:30:00

<b>Key</b>	<b>Value</b>
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

### Job 7 (1b02e943): Run 7 using Build 1 (379cd7a0)

<b>Key</b>	<b>Value</b>
courant	0.3d0
dmax	16
dmin	16
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/16
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

### Job 8 (0d6ef269): Run 8 using Build 1 (379cd7a0)

<b>Key</b>	<b>Value</b>
courant	0.3d0
dmax	17
dmin	17
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/17
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

### Job 9 (4882ba2a): Run 9 using Build 1 (379cd7a0)

Key	Value
courant	0.3d0
dmax	18
dmin	18
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_edge/18
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

#### Job 10 (fd7821c4): Run 1 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	10
dmin	10
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/10
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

#### Job 11 (c9b30b13): Run 2 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	11
dmin	11
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1

Key	Value
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/11
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

#### Job 12 (5bf5d584): Run 3 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	12
dmin	12
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/12
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	""

#### Job 13 (891c9686): Run 4 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	13
dmin	13
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/13
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0

Key	Value
xdmf_output	““

#### Job 14 (59692f55): Run 5 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	14
dmin	14
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/14
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

#### Job 15 (293fdd41): Run 6 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	15
dmin	15
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/15
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

#### Job 16 (7510ecec): Run 7 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0

Key	Value
dmax	16
dmin	16
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/16
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

### Job 17 (f94fcfed): Run 8 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	17
dmin	17
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/17
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

### Job 18 (fff29120): Run 9 using Build 2 (1e8479ed)

Key	Value
courant	0.3d0
dmax	18
dmin	18
dry_tolerance	0.00000001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	1
ntasks	1

Key	Value
output_base	/opt/samoa/output
output_dir	oscillating_lake/series/BJ_vertex/18
partition	test
threads	48
time	00:30:00
tmax	8.97140293d0
tout	8.97140293d0
xdmf_output	““

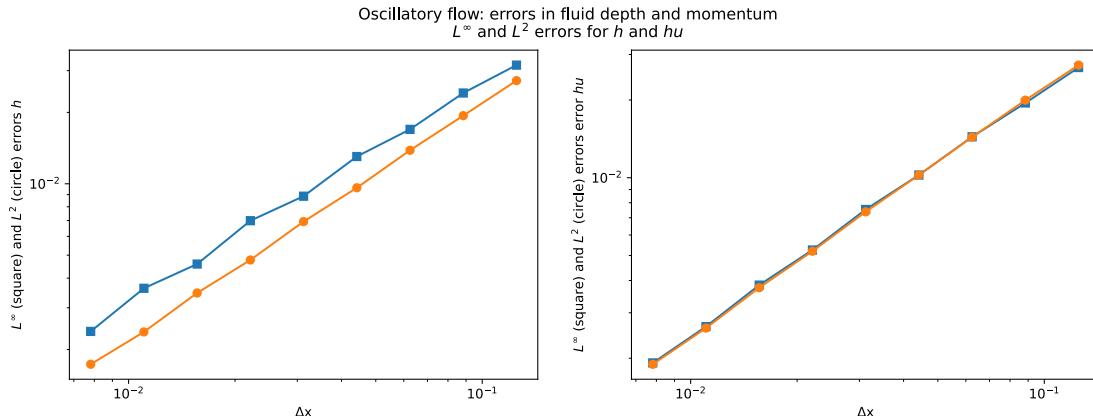
## Expanded postprocessing calls

Process 1 (2374b696): Task 1 using Build 1 (379cd7a0)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute_once	.../.../post/oscillating_lake.py -i output_base/oscillating_lake/series/BJ_edge -o \$CACHE/results/oscillating_lake/series/BJ_edge -s series

## Results

/opt/samoa/time-to-solution/flash/results/oscillating\_lake/series/BJ\_edge/series.svg



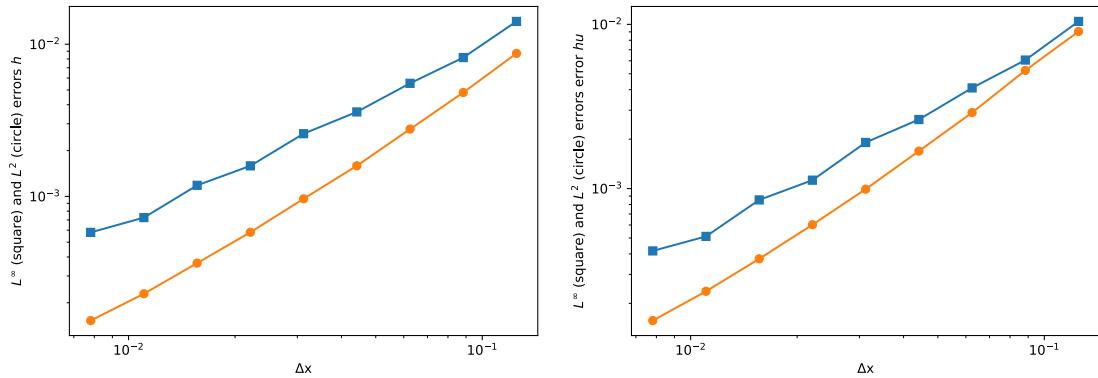
Process 2 (8bc518c5): Task 1 using Build 2 (1e8479ed)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute_once	.../.../post/oscillating_lake.py -i output_base/oscillating_lake/series/BJ_vertex -o \$CACHE/results/oscillating_lake/series/BJ_vertex -s series

## Results

/opt/samoa/time-to-solution/flash/results/oscillating\_lake/series/BJ\_vertex/series.svg

Oscillatory flow: errors in fluid depth and momentum  
 $L^\infty$  and  $L^2$  errors for  $h$  and  $hu$



# Chapter 7

## Scenario 4.5: Runup onto a complex three-dimensional beach

### Notes

Experimental solutions for specific points in time are provided by [http://isec.nacse.org/workshop/2004\\_cornell/bmark2.html](http://isec.nacse.org/workshop/2004_cornell/bmark2.html) and converted to CSV here.

The refinement level 18 was chosen, which results in tba cells, which is roughly the same for the rectangular section where the bathymetry is given as in [1]: see section 4.6, paragraph three.

The dry/wet tolerance of `10e-4` and the simulation time of 40 were directly taken from [1].

The courant number of 0.3 was found using trial and error. The average computation time step size is about `tba` seconds, while the fixed time step size in [1] is 0.001 seconds.

A XDMF output filter is used to limit the output to a rectangle at the shore which contains the gauges.

To fill the square domain, the bathymetry of the most bottom position was extended downwards.

For the incoming wave, a boundary condition is set with time-dependent water height values read from a file.

### Evaluation

The water height at the gauge positions are sampled for each output step and plotted. These results can then be compared with [1], see figure 18.

Heightmap plots at  $t = 15.0, 15.5, 16.0, 16.5, 17.0$  are generated for the full domain. These results can then be compared with [1], see figure 19.

### Configuration sources

- File: `configs/machines/supermuc/config.json`
- File: `configs/flash.json`
- File: `configs/scenarios/okushiri.json`
- Inline: 

```
{"samoa_dir": "../samoa-flash", "cache_dir": "/opt/samoa/time-to-solution/flash",
"run": {"output_base": "/opt/samoa/output"}}
```

## Build configuration templates

### Build 1 (5c38d80a)

Key	Value
asagi	true
boundary	file
flash_order	1
limiter	BJ_edge
scenario	flash
swe_scenario	asagi

### Build 2 (c2867693)

Key	Value
asagi	true
boundary	file
flash_order	1
limiter	BJ_vertex
scenario	flash
swe_scenario	asagi

## Run configuration templates

### Run 1

Key	Value
bath	scripts/FlashAnalysis/verification/data/okushiri/bathymetry.nc
boundary_file	scripts/FlashAnalysis/verification/data/okushiri/boundary.csv
boundary_sid8	
courant	0.3d0
disp	scripts/FlashAnalysis/verification/data/okushiri/displacement.nc
dmax	18
dmin	18
dry_tolerance	0.0001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	okushiri/limiter
partition	test
static_displacement	threads   ``48``    time   ``00:30:00``    tmax   ``40``    tout   ``0.05d0``    xdmf_filter_index   ``1``    xdmf_filter_params   ``4.5215.448 1.196 2.4``    xdmf_output

## Postprocessing configuration templates

### Task 1

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/okushiri.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s surface

### Task 2

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	../../post/okushiri.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s gauges -d ../../post/reference/okushiri

## Expanded computation jobs

### Job 1 (e677bca5): Run 1 using Build 1 (5c38d80a)

Key	Value
bath	scripts/FlashAnalysis/verification/data/okushiri/bathymetry.nc
boundary_file	scripts/FlashAnalysis/verification/data/okushiri/boundary.csv
boundary_sid8	
courant	0.3d0
disp	scripts/FlashAnalysis/verification/data/okushiri/displacement.nc
dmax	18
dmin	18
dry_tolerance	0.0001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	okushiri/BJ_edge
partition	test
static_displacemtenthreads   ``48``    time   ``00:30:00``    tmax   ``40``    tout   ``0.05d0``    xdmf_filter_index   ``1``    xdmf_filter_params   ``4.521 5.448 1.196 2.4``    xdmf_output	

### Job 2 (75b71a59): Run 1 using Build 2 (c2867693)

Key	Value
bath	scripts/FlashAnalysis/verification/data/okushiri/bathymetry.nc
boundary_file	scripts/FlashAnalysis/verification/data/okushiri/boundary.csv
boundary_sid8	

Key	Value
courant	0.3d0
disp	scripts/FlashAnalysis/verification/data/okushiri/displacement.nc
dmax	18
dmin	18
dry_tolerance	0.0001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	okushiri/BJ_vertex
partition	test
static_displacement	threads   ``48``    time   ``00:30:00``    tmax   ``40``    tout   ``0.05d0``    xdmf_filter_index   ``1``    xdmf_filter_params   ``4.521 5.448 1.196 2.4``    xdmf_output

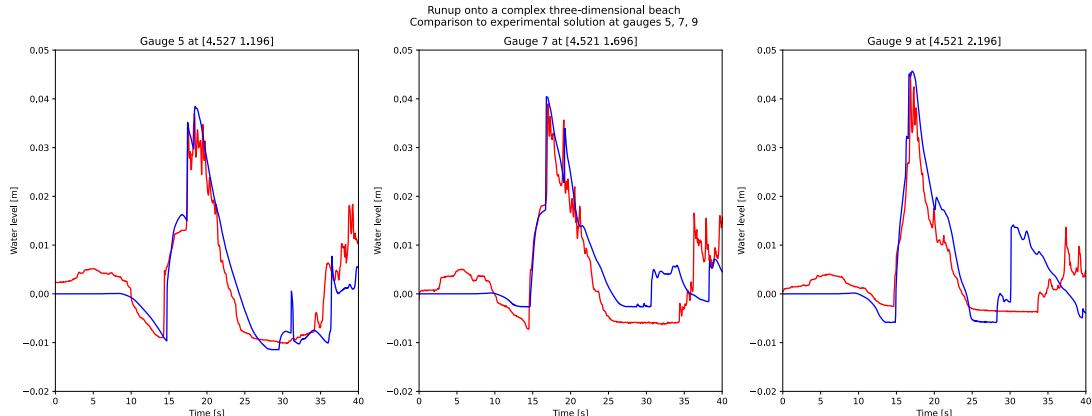
## Expanded postprocessing calls

Process 1 (71187375): Task 1 using Job 1 (e677bca5)

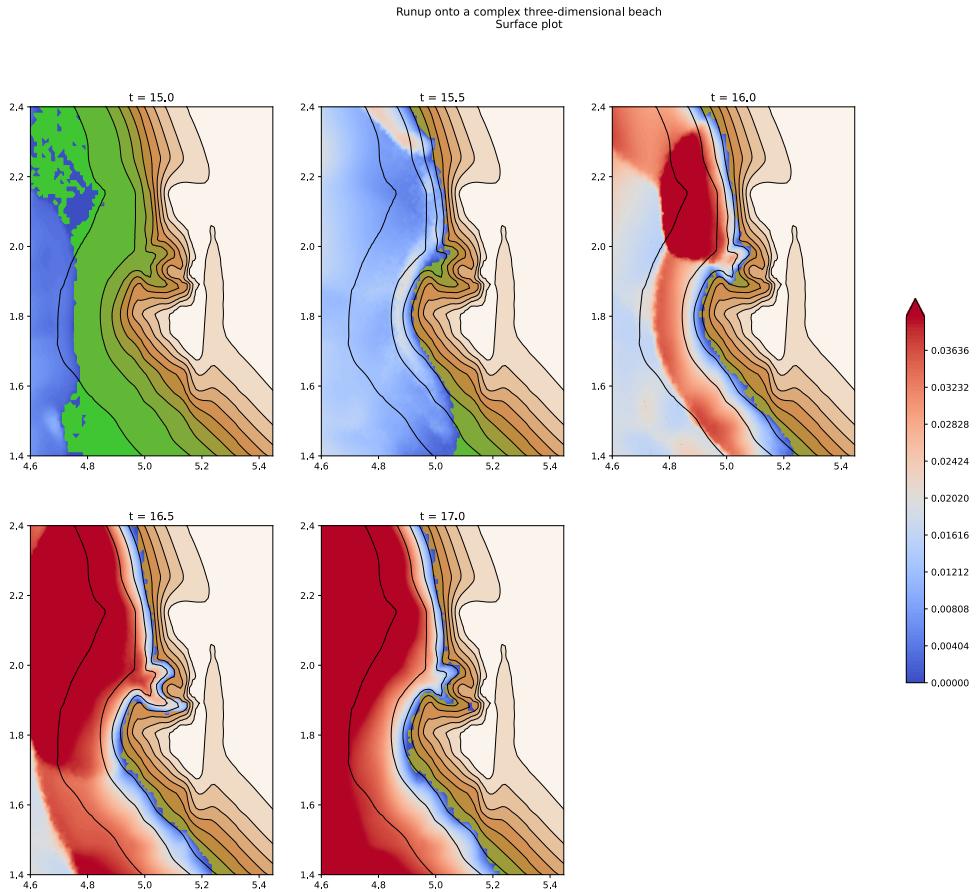
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/okushiri.py -i `find "/opt/samoa/output/okushiri/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/okushiri/BJ_edge -n 48 -s surface

## Results

/opt/samoa/time-to-solution/flash/results/okushiri/BJ\_edge/csvcomp.svg



/opt/samoa/time-to-solution/flash/results/okushiri/BJ\_edge/surface.svg

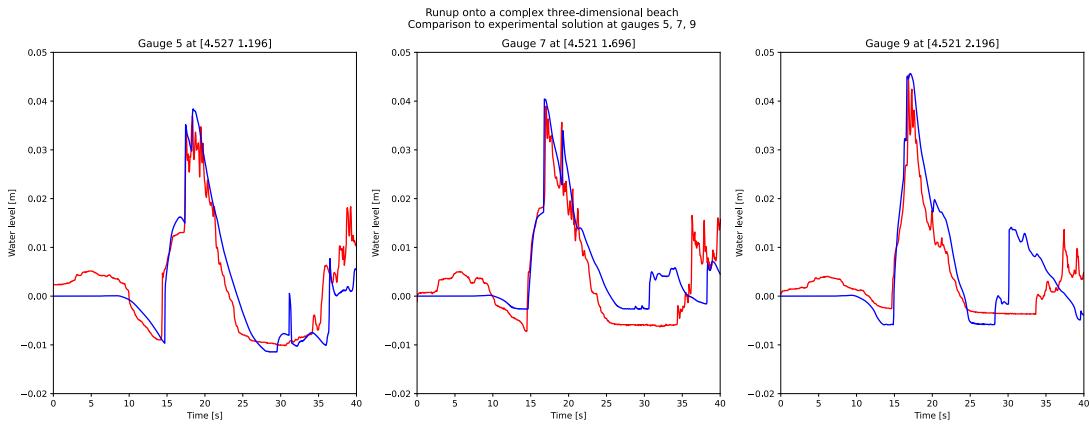


## Process 2 (bc878f57): Task 2 using Job 1 (e677bca5)

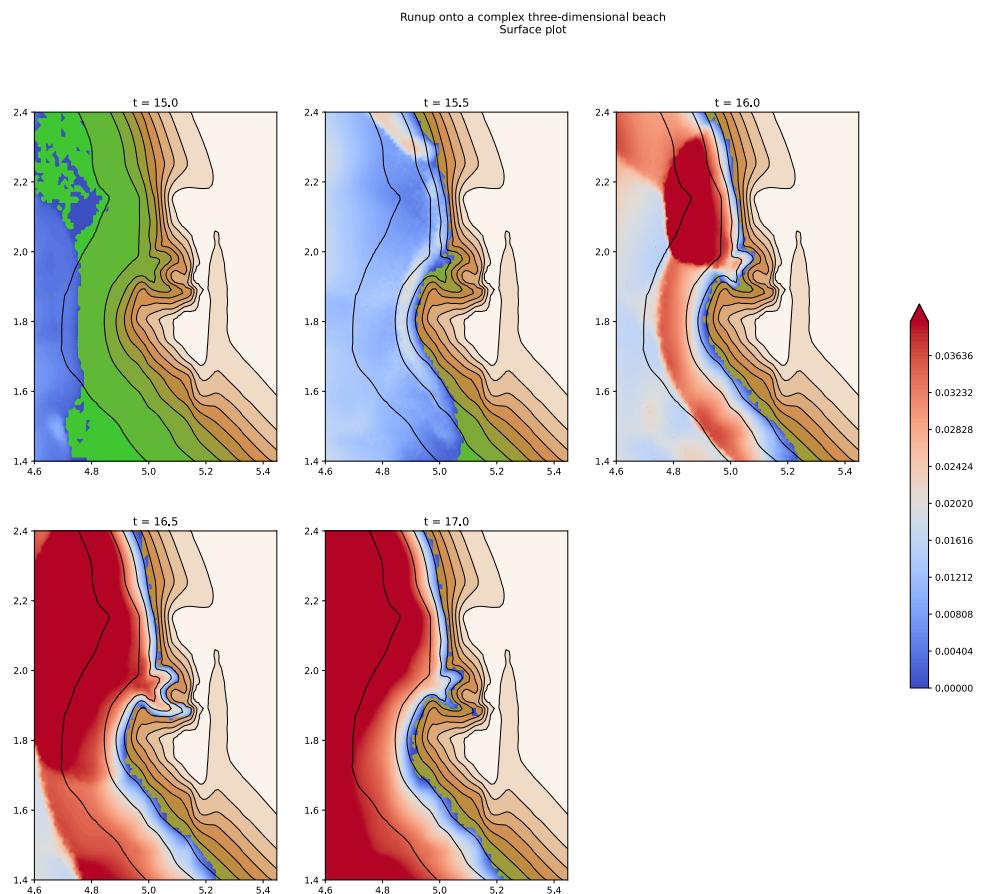
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/okushiri.py -i `find "/opt/samoa/output/okushiri/BJ_edge/"` -type f -name '*.xmf'` -o \$CACHE/results/okushiri/BJ_edge -n 48 -s gauges -d .../post/reference/okushiri

## Results

/opt/samoa/time-to-solution/flash/results/okushiri/BJ\_edge/csvcomp.svg



/opt/samoa/time-to-solution/flash/results/okushiri/BJ\_edge/surface.svg



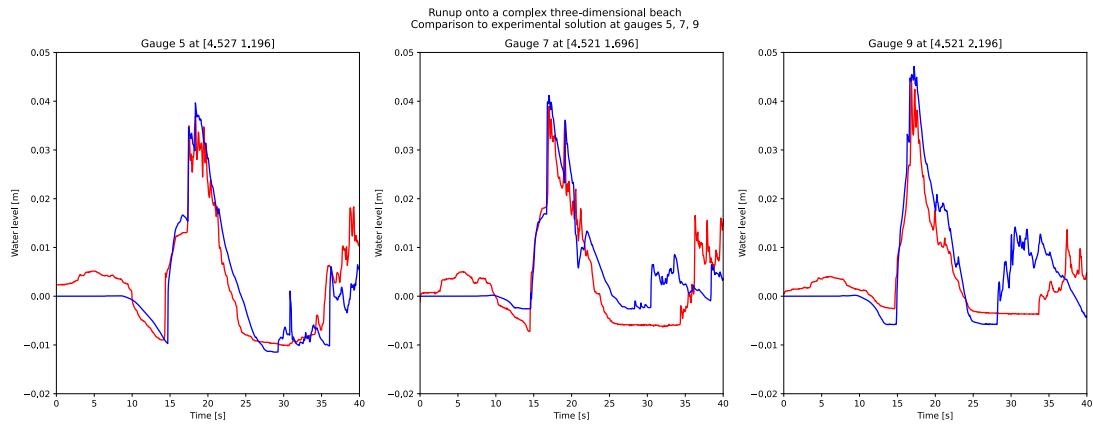
### Process 3 (2fb0e9b2): Task 1 using Job 2 (75b71a59)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios

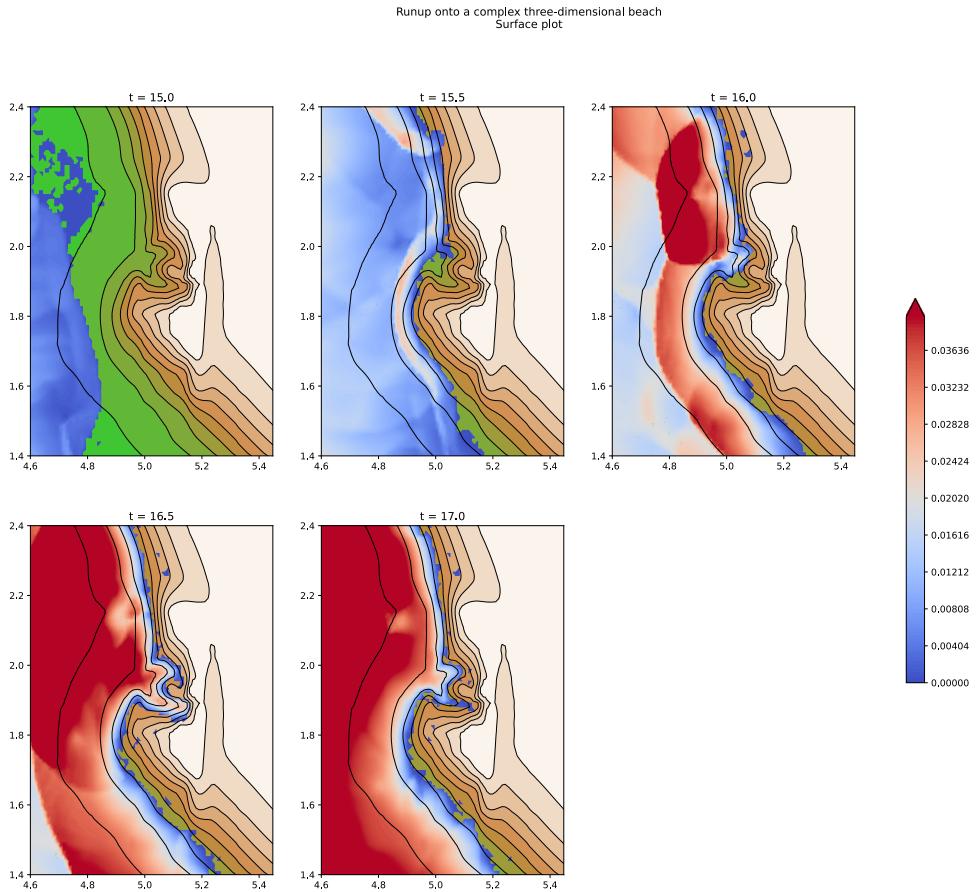
Key	Value
execute	<pre>../../../../post/okushiri.py -i `find "/opt/samoa/output/okushiri/BJ_vertex/" -type f -name '*.xmf'` -o \$CACHE/results/okushiri/BJ_vertex -n 48 -s surface</pre>

## Results

/opt/samoa/time-to-solution/flash/results/okushiri/BJ\_vertex/csvcomp.svg



/opt/samoa/time-to-solution/flash/results/okushiri/BJ\_vertex/surface.svg

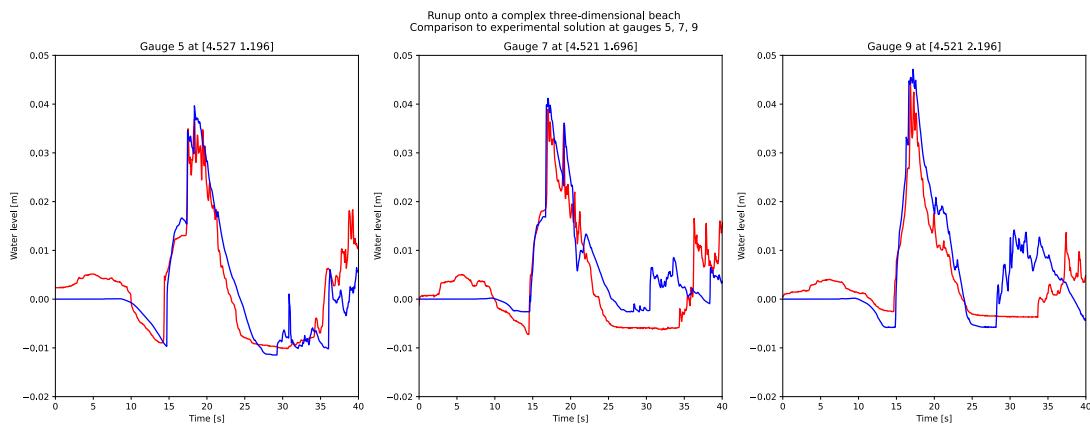


## Process 4 (79db2aa6): Task 2 using Job 2 (75b71a59)

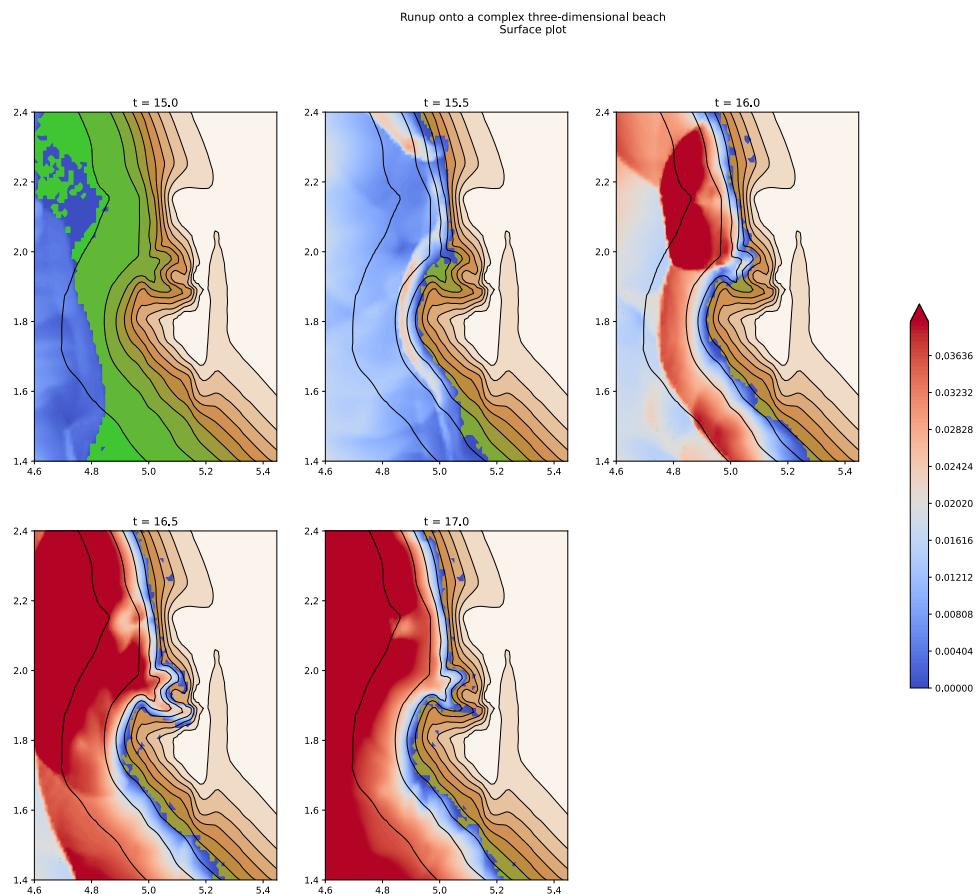
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios
execute	.../.../post/okushiri.py -i `find "/opt/samoa/output/okushiri/BJ_vertex/"` -type f -name '*.xmf'` -o \$CACHE/results/okushiri/BJ_vertex -n 48 -s gauges -d .../post/reference/okushiri

## Results

/opt/samoa/time-to-solution/flash/results/okushiri/BJ\_vertex/csvcomp.svg



/opt/samoa/time-to-solution/flash/results/okushiri/BJ\_vertex/surface.svg



# Chapter 8

## Scenario 4.6: Flow around a conical island

### Notes

Experimental solutions for specific points in time are provided by <https://nctr.pmel.noaa.gov/benchmark/Laboratory/Laboratory> and converted to CSV here.

The refinement level 20 was chosen, which results in 2097152 cells, the same as in [1]: see section 4.6, paragraph three.

The dry/wet tolerance of `10e-3` and the simulation time of 20 were directly taken from [1].

The courant number of 0.3 was found using trial and error. The average computation time step size is about `tba` seconds, while the fixed time step size in [1] is 0.0025 seconds.

A XDMF output filter is used to limit the output to the region around the island. This is to reduce disk space usage. A second dataset contains the whole domain at every second.

For the incoming wave, a boundary condition is set with a time-dependent water height function.

### Evaluation

The water height at the gauge positions are sampled for each output step and plotted. These results can then be compared with [1], see figure 21 and 22.

Heightmap plots at two different times for each scenario are generated for the full domain. These results can then be compared with [1], see figure 23.

### Configuration sources

- File: `configs/machines/supermuc/config.json`
- File: `configs/flash.json`
- File: `configs/scenarios/conical_island_a.json`
- Inline: 

```
{"samoan_dir": ".../samoan-flash", "cache_dir": "/opt/samoan/time-to-solution/flash",  
"run": {"output_base": "/opt/samoan/output"}}
```

## Build configuration templates

### Build 1 (3fe3cc9a)

Key	Value
asagi	false
boundary	function
flash_order	1
limiter	BJ_edge
scenario	flash
swe_scenario	conical_island_a

### Build 2 (406e6f0b)

Key	Value
asagi	false
boundary	function
flash_order	1
limiter	BJ_vertex
scenario	flash
swe_scenario	conical_island_a

## Run configuration templates

### Run 1

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpiexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	_scenario_base/_scenario_variant/fine/limiter
partition	test
threads	48
time	00:30:00
tmax	20
tout	0.05d0
tstart	0
xdmf_filter_index	3
xdmf_filter_params	3.7 12.96 13.8
xdmf_output	“”

## Run 2

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	_scenario_base/_scenario_variant/full/limiter
partition	test
threads	48
time	00:30:00
tmax	16
tout	1
tstart	12.5d0
xdmf_filter_index	0
xdmf_filter_params	xdmf_output

## Postprocessing configuration templates

### Task 1

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep
execute	../../../../post/conical_island.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s _type_variant__scenario_variant -d ../../..../post/reference/conical_island

## Expanded computation jobs

### Job 1 (a24517f2): Run 1 using Build 1 (3fe3cc9a)

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output

Key	Value
output_dir	conical_island/a/fine/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	20
tout	0.05d0
tstart	0
xdmf_filter_index	3
xdmf_filter_params	3.7 12.96 13.8
xdmf_output	“”

### Job 2 (cde63b20): Run 2 using Build 1 (3fe3cc9a)

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpieexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	conical_island/a/full/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	16
tout	1
tstart	12.5d0
xdmf_filter_index	0
xdmf_filter_params	xdmf_output

### Job 3 (376748a8): Run 1 using Build 2 (406e6f0b)

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpieexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	conical_island/a/fine/BJ_vertex

Key	Value
partition	test
threads	48
time	00:30:00
tmax	20
tout	0.05d0
tstart	0
xdmf_filter_index	3
xdmf_filter_params	3.7 12.96 13.8
xdmf_output	“”

#### Job 4 (9ec4339f): Run 2 using Build 2 (406e6f0b)

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpieexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	conical_island/a/full/BJ_vertex
partition	test
threads	48
time	00:30:00
tmax	16
tout	1
tstart	12.5d0
xdmf_filter_index	0
xdmf_filter_params	xdmf_output

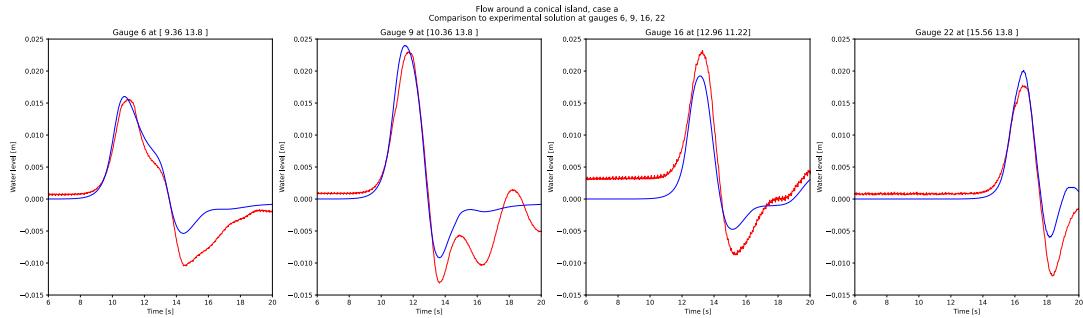
#### Expanded postprocessing calls

##### Process 1 (9c11f0f8): Task 1 using Job 1 (a24517f2)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep
execute	../../../../post/conical_island.py -i `find "/opt/samoa/output/conical_island/a/fine/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/conical_island/a/fine/BJ_edge -n 48 -s gauges_a -d ../../../../post/reference/conical_island

#### Results

/opt/samoa/time-to-solution/flash/results/conical\_island/a/fine/BJ\_edge/csvcomp.svg



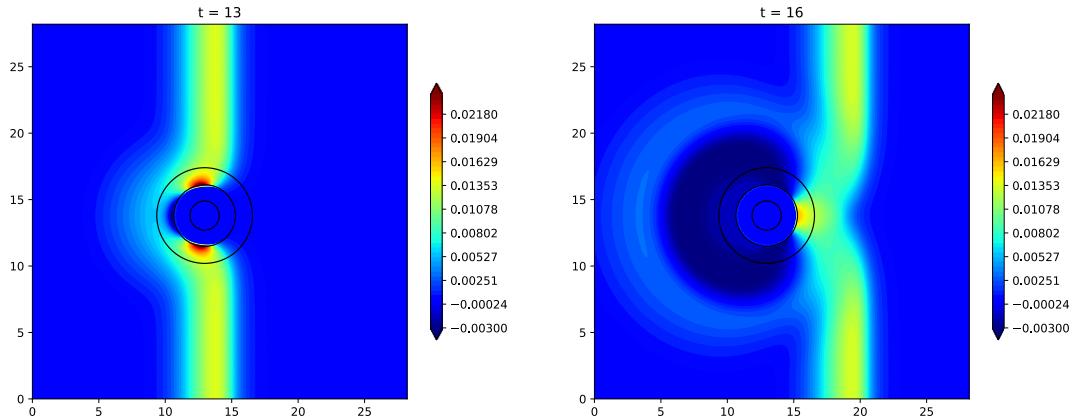
## Process 2 (4256c20e): Task 1 using Job 2 (cde63b20)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep
execute	../../../../post/conical_island.py -i `find "/opt/samoa/output/conical_island/a/full/BJ_edge/" -type f -name '* .xmf'` -o \$CACHE/results/conical_island/a/full/BJ_edge -n 48 -s surface_a -d ../../../../post/reference/conical_island

## Results

/opt/samoa/time-to-solution/flash/results/conical\_island/a/full/BJ\_edge/surface.svg

Flow around a conical island, case a  
Surface plot



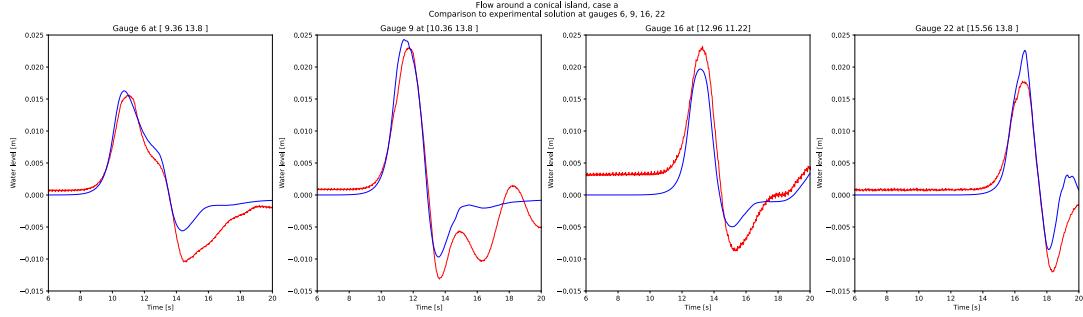
## Process 3 (83c7ba42): Task 1 using Job 3 (376748a8)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep

Key	Value
execute	<pre>../../../../post/conical_island.py -i `find "/opt/samoa/output/conical_island/a/fine/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/conical_island/a/fine/BJ_vertex -n 48 -s gauges_a -d ../../post/reference/conical_island</pre>

## Results

/opt/samoa/time-to-solution/flash/results/conical\_island/a/fine/BJ\_vertex/csvcomp.svg



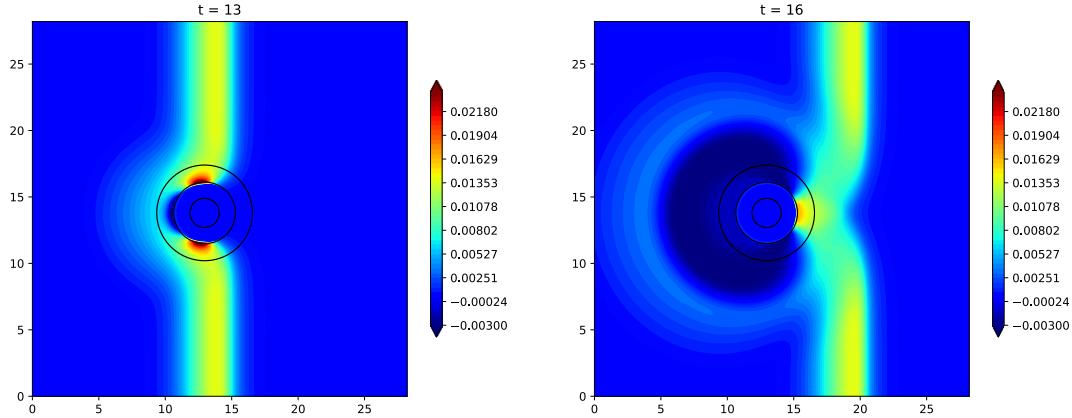
## Process 4 (90e34ce5): Task 1 using Job 4 (9ec4339f)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep
execute	<pre>../../../../post/conical_island.py -i `find "/opt/samoa/output/conical_island/a/full/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/conical_island/a/full/BJ_vertex -n 48 -s surface_a -d ../../post/reference/conical_island</pre>

## Results

/opt/samoa/time-to-solution/flash/results/conical\_island/a/full/BJ\_vertex/surface.svg

Flow around a conical island, case a  
Surface plot



## Configuration sources

- File: `configs/machines/supermuc/config.json`
- File: `configs/flash.json`
- File: `configs/scenarios/conical_island_c.json`
- Inline: `{"samoa_dir": "../samoa-flash", "cache_dir": "/opt/samoa/time-to-solution/flash", "run": {"output_base": "/opt/samoa/output"}}`

## Build configuration templates

### Build 1 (6f79c212)

Key	Value
asagi	false
boundary	function
flash_order	1
limiter	BJ_edge
scenario	flash
swe_scenario	conical_island_c

### Build 2 (e3620e6a)

Key	Value
asagi	false
boundary	function
flash_order	1
limiter	BJ_vertex
scenario	flash

Key	Value
swe_scenario	<u>conical_island_c</u>

## Run configuration templates

### Run 1

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpieexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	_scenario_base/_scenario_variant/fine/limiter
partition	test
threads	48
time	00:30:00
tmax	20
tout	0.05d0
tstart	0
xdmf_filter_index	3
xdmf_filter_params	3.7 12.96 13.8
xdmf_output	““

### Run 2

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpieexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	_scenario_base/_scenario_variant/full/limiter
partition	test
threads	48
time	00:30:00
tmax	14
tout	1
tstart	10.5d0

Key	Value
xdmf_filter_index	0
xdmf_filter_params	xdmf_output

## Postprocessing configuration templates

### Task 1

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep
execute	../../post/conical_island.py -i `find "output_base/output_dir/" -type f -name '*.xmf'` -o \$CACHE/results/output_dir -n 48 -s _type_variant_scenario_variant -d ../../post/reference/conical_island

## Expanded computation jobs

### Job 1 (4a173349): Run 1 using Build 1 (6f79c212)

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpieexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	conical_island/c/fine/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	20
tout	0.05d0
tstart	0
xdmf_filter_index	3
xdmf_filter_params	3.7 12.96 13.8
xdmf_output	""

### Job 2 (e6deb42b): Run 2 using Build 1 (6f79c212)

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20

Key	Value
dry_tolerance	0.001d0
execute	mpieexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	conical_island/c/full/BJ_edge
partition	test
threads	48
time	00:30:00
tmax	14
tout	1
tstart	10.5d0
xmf_filter_index	0
xmf_filter_params	xmf_output

### Job 3 (567ddfaf): Run 1 using Build 2 (e3620e6a)

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0
execute	mpieexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	conical_island/c/fine/BJ_vertex
partition	test
threads	48
time	00:30:00
tmax	20
tout	0.05d0
tstart	0
xmf_filter_index	3
xmf_filter_params	3.7 12.96 13.8
xmf_output	““

### Job 4 (fbc4b1b2): Run 2 using Build 2 (e3620e6a)

Key	Value
boundary_side	3
courant	0.3d0
dmax	20
dmin	20
dry_tolerance	0.001d0

Key	Value
execute	mpexec -np \${SLURM_NTASKS}
execute_mode	absolute
manning	-1.0d0
nodes	8
ntasks	8
output_base	/opt/samoa/output
output_dir	conical_island/c/full/BJ_vertex
partition	test
threads	48
time	00:30:00
tmax	14
tout	1
tstart	10.5d0
xmf_filter_index	0
xmf_filter_params	xdmf_output

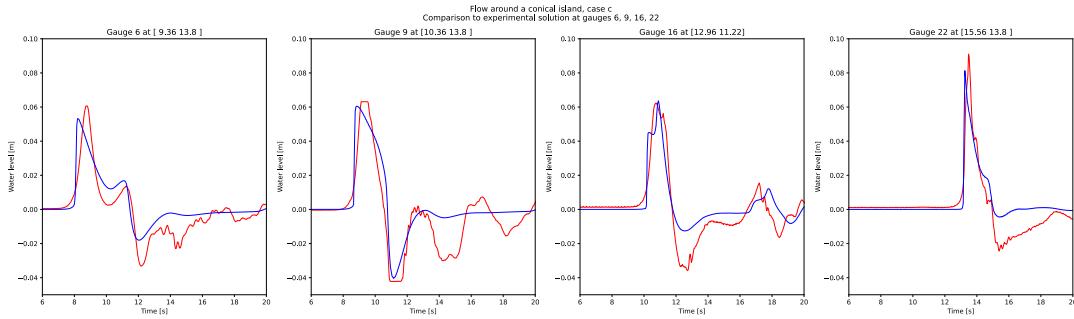
## Expanded postprocessing calls

Process 1 (fbe31574): Task 1 using Job 1 (4a173349)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep
execute	./.../post/conical_island.py -i `find "/opt/samoa/output/conical_island/c/fine/BJ_edge/" -type f -name '*.xmf'` -o \$CACHE/results/conical_island/c/fine/BJ_edge -n 48 -s gauges_c -d ./.../post/reference/conical_island

## Results

/opt/samoa/time-to-solution/flash/results/conical\_island/c/fine/BJ\_edge/csvcomp.svg



Process 2 (26417767): Task 1 using Job 2 (e6deb42b)

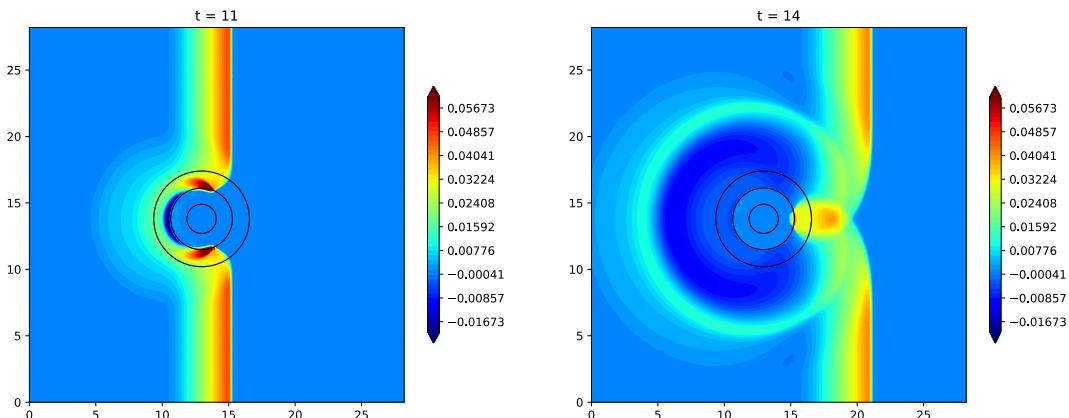
Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep

Key	Value
execute	<pre>../../../../post/conical_island.py -i `find "/opt/samoa/output/conical_island/c/full/BJ_edge/" -type f -name '*.xmf'`  -o \$CACHE/results/conical_island/c/full/BJ_edge -n 48 -s surface_c -d ../../../../post/reference/conical_island</pre>

## Results

/opt/samoa/time-to-solution/flash/results/conical\_island/c/full/BJ\_edge/surface.svg

Flow around a conical island, case c  
Surface plot

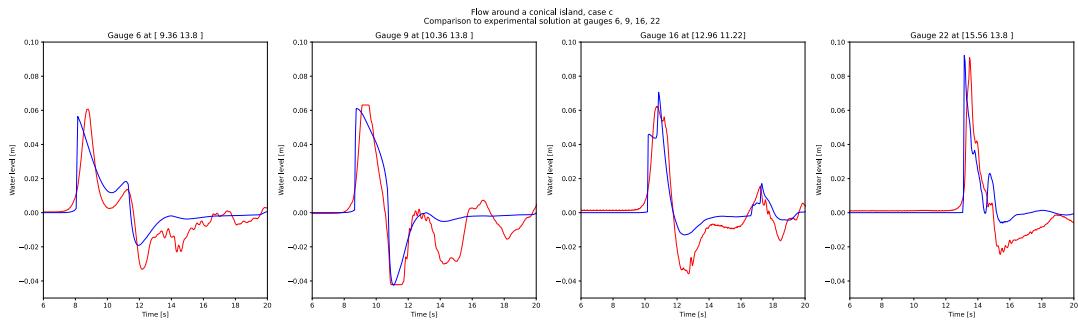


## Process 3 (e6d45fdf): Task 1 using Job 3 (567ddfaf)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep
execute	<pre>../../../../post/conical_island.py -i `find "/opt/samoa/output/conical_island/c/fine/BJ_vertex/" -type f -name '* .xmf'` -o \$CACHE/results/conical_island/c/fine/BJ_vertex -n 48 -s gauges_c -d ../../post/reference/conical_island</pre>

## Results

/opt/samoa/time-to-solution/flash/results/conical\_island/c/fine/BJ\_vertex/csvcomp.svg



## Process 4 (9c8cf72): Task 1 using Job 4 (fbc4b1b2)

Key	Value
cwd	/home/christoph/samoa/test-scripts/configs/scenarios/dep
execute	../../../../post/conical_island.py -i `find "/opt/samoa/output/conical_island/c/full/BJ_vertex/" -type f -name '*.*mf'` -o \$CACHE/results/conical_island/c/full/BJ_vertex -n 48 -s surface_c -d ../../post/reference/conical_island

## Results

/opt/samoa/time-to-solution/flash/results/conical\_island/c/full/BJ\_vertex/surface.svg

Flow around a conical island, case c  
Surface plot

