

User Trainings for Hydro-Morphological Simulation Software 2017

Organized by UHM River Engineering, Karlsruhe

Advance in Open Channel Flow Modelling in 2017!

Dear Telemac users, customers, colleagues and friends,

Due to the still growing response to the *Entry Level Courses* we proceed in the 5th year of user trainings. Even though the first trainings at the Flanders Hydraulic Laboratories and at the Laboratorio Nacional in Lima are finished without ever being announced, we still have 3 more public courses to offer.

I'm very glad, that I could win Dr. Jean-Michel Hervouet and Dr. Catherine Villaret again for an Advanced User Training. The list of topics corresponds to Course II of 2016 and the training materials have been updated and extended.

This course shall give us confidence to answer the omnipresent questions of a modellers working life: Which options shall I take? Am I within the definition range? What is theory behind the keywords?

For those who plan to start at an entry level, the Course IV will be the right decision.

New program versions bring new functions, and new users ask new questions. So I decided to configure a new version of the Telemac Life Cluster and to update the training examples. As the years before, there will be two public trainings (German or English) which can also be held as in-house training for those who miss the date or like an even more private and project based consulting.

Don't hesitate to contact us to receive the final program updates and for further information.

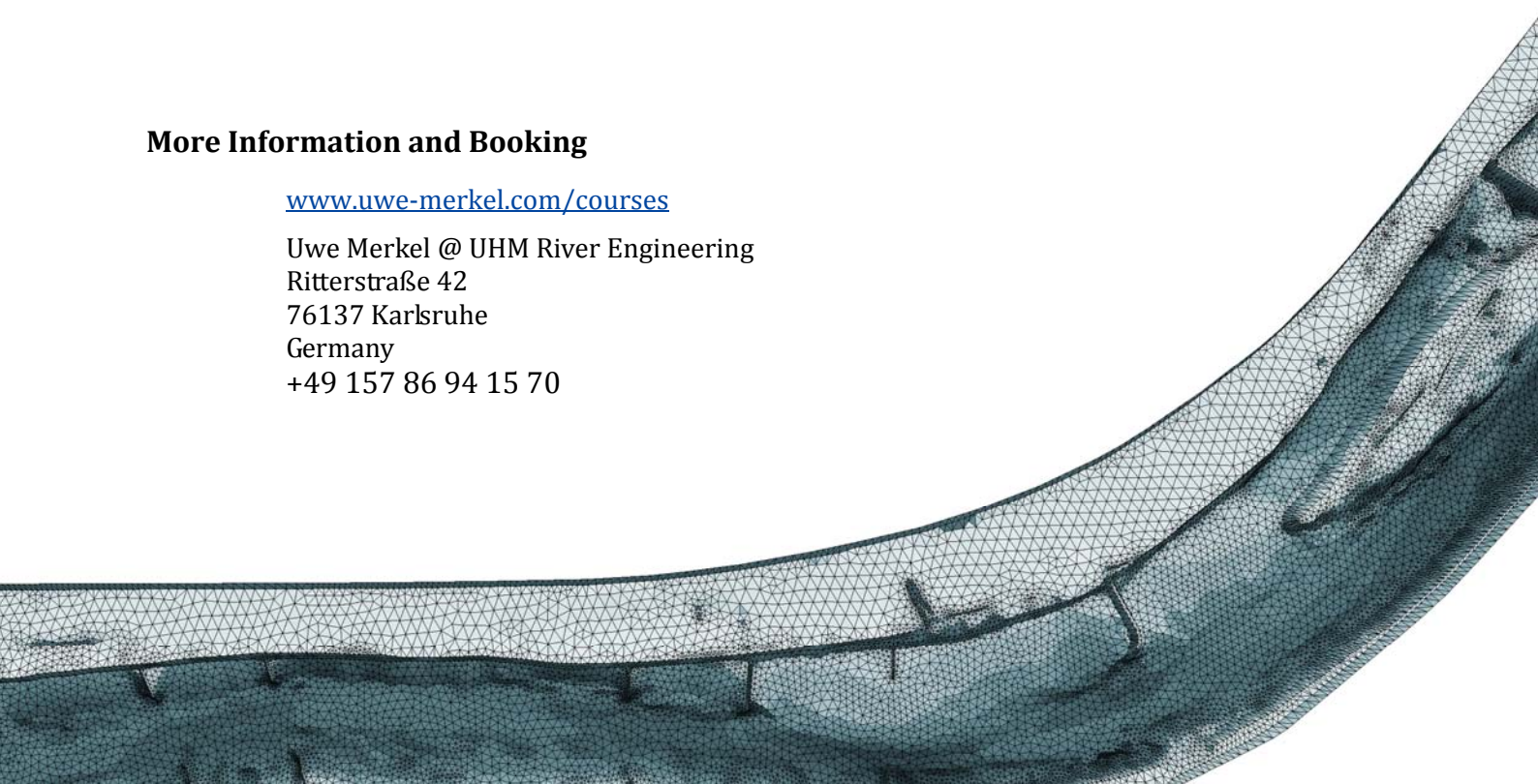
All the best,

Uwe Merkel

More Information and Booking

www.uwe-merkel.com/courses

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Course IV: Free Surface Flow Modelling with Open Source Software

Tutor: Uwe Merkel

(4 day intensive user training, entry level, English)



available in
German on
demand

Motivation: The numerical modelling of free surface flows undergoes major changes. Almost every university or major company developed their own source code until only few years ago. But since few years, more and more companies join forces and change their software licenses to open source.

One motivation is the fact that it was always necessary to provide source code instead of binaries. Unlike to widespread office software, numerical analysis software almost always deals with non standard cases. Therefore, a universal software package can neither be developed nor could a high number of features be paid by only one developing organisation. As most users extend the code to their own needs anyway, through the Open Source Model everybody can benefit from each others developments. This results in a dramatic increase of features.

A second very important motivation to use Open Source is the need for transparency and acceptance to convince both, clients and critics. Every other engineer can check the correctness of the included formulas.

However, due to the mass of features, it is hard to keep track, and even harder to find the right access point if you start from the scratch with Linux setups, pre- & post processing tools, software versions, mathematical methods or the search for suitable hardware. The theories of hydraulic modelling are taught at universities, but an engineer's work provides many additional hurdles that have to be taken economically.

Therefore the main goal of our courses is to show you the easiest possible access to a full tool chain of market leading applications like TELEMAC Suite - PARAVIEW - QGIS - Blue Kenue - MPICH - TorquePBS - GNUFortran and CODE::BLOCKS. Avoid beginner's mistakes, week long trial & error and don't waste too much time configuring Linux. After the course, you will handle all core disciplines and know the ways to head on auto-didactically.

We learn in 3 steps: [Explanation](#) -> [Demonstration](#) -> [Application, on your own PC!](#)

Day 1: First Steps in the Telemac Universe

Not all beginnings are difficult if you know where to look for. We analyse the program structures and interfaces. Your first own models will be started from scratch, calculated and analysed in detail by the end of this day.

- Features, Possibilities & Limits
 - Flow in 2D and 3D
 - Sediments, wind & waves
- Structure of the Telemac Suite
 - Don't fear the command line!
 - Files & modules
 - Common mistakes
- Demonstration: basic examples
 - Analyse datasets with Paraview and an editor
 - Start and monitor calculations
 - Change your configuration

- Exercise A-I: Hands on the software!
 - Get used to console and scripts
 - Change values and configuration
 - Make mistakes and learn to understand them!

Lunch break

- Configurations
 - Overview on 600+ options! Do I have to understand them all?
 - Which turbulence model, advection scheme, et cetera is the right one? (1 min)
 - Troubleshooting
- Demonstration: Pre & post processing
 - PARAVIEW, BlueKenue, QGIS, BaseMesh, OpenOffice etc.
 - Understand the LOG-files
- Exercise A-II: Build your own model
 - Meshing
 - Configure and calculate
 - Check results with QGIS & Paraview & log-files

Day 2: Speed up with parallel computing

To consolidate your new knowledge, we repeat Day 1 tasks, but in higher complexity. Now you will realize: computer power can't be replaced by anything then more computer power. For many practical applications a state of the art office computer with 4 cores or more is good enough. A live demonstration will show you how a simple 128 core Xeon server for less than 5000€ can speed up your calculations more than a 100 times. For even more performance you just rent as much as you need from a cloud service provider by hour and control it from your desktop.

- How parallel processing works
 - Domain decomposition of a large project in many small projects
 - Distribution over several computers and connection via MPI
 - The right hardware for your purpose
- Demonstration: Understand desktop, workstation und cluster layout
 - Live demo of the training servers with its 128 Xeon cores.
- Exercise B-I: Parallel computing
 - Divide and combine projects: Partel & Gretel
 - Run jobs in different configurations and benchmark it
 - Try fast, efficient, decentralised setups

Lunch break

- Resource efficiency: Queuing with TorquePBS
 - Queuing jobs
 - Priorities jobs overtake the queue
 - Distribute jobs to different computers
- Demonstration: Calculating online in the rented cloud
- Group Exercise B-II: Queues
 - We connect some of the trainee's computers to a cluster.
 - We find the fastest combination of our computers with standard office network equipment.
 - We use the cluster and the trainings server to run a Monte Carlo sensitivity study.

Day 3: Modify and extend your software

Special needs for special projects might need special modifications. Time dependent changes of the geometry, new empiric rules or unprecedented boundary conditions can be coded with only few lines. Don't fear to mess with the source code! Understand the architecture of the software and avoid the common errors with this introduction in the development. You don't have to be a programmer to change values. We start at a basic level. But for those who are familiar with FORTRAN we provide advanced exercises.

- The development environment CODE::BLOCKS
 - The preconfigured environment for Telemac.
 - Little helpers of the IDE
- Demonstration: Architecture of TELEMAC
 - Find the right variable
 - Working with the mesh (TIN)
 - Basic input & output
- Exercise C-I: Modify initial and boundary conditions
 - Write your own outputs
 - Roughness and topography modifications
 - Integrate volumes

Lunch break

- Demonstration: Integrate volumes in parallel computations
- Compiling
 - Find errors (Debug)
 - Optimize and find bottlenecks (Profiling)
- Tips, Tricks & Traps
 - Home made accuracy problems (Truncation error)
 - Calculating with mesh arithmetic
- Exercise C-II: Your own routine
 - Write your own plug-in
 - Working with the mesh
 - Working with the time loop

Day 4: Your preferred topics

For those who want to practise more under supervision we offer the optional Day 4. The topics are chosen according to participant's wishes. In the past sessions we focused on mesh generation, sensitivities, uncertainties & professional calibration, post processing with Python, SciPy and Matplotlib and we designed action plans for real projects participants already have in mind.

Training Material

We provide a bootable 128GB SSD with a preinstalled and preconfigured **Ubuntu 16.04 LTS**. It includes an extensively tuned collection of programmes, with all manuals and examples. If you work during the training with this disk on your own laptop, we can be sure that all exercises work when you're back at home, without configuration marathons and messed up primary discs. Please understand that we do not sell software, as all included software is free anyway under LGPL and GNU license.

Dates & Cost

We limit the number of participants to a maximum of 10 for this Entry Level Courses, to guarantee individual support and teaching in dialogue form. The 2017 user trainings will be in

May 29th to June 2nd 2017 *Fasanenschlösschen, Karlsruhe, Germany.*

September 12th to 15th 2017 *Fasanenschlösschen, Karlsruhe, Germany.*

“Early birds” reduced fee for booking until 21 days before the training: 1490€
Regular Fee: 1790€

This includes the course itself, catering and the 128GB Training SSD. The additional VAT is applicable according to the laws in the country of presentation. This equals 19% for trainings in Germany. Some public and non commercial institutions may not need to pay the VAT. If you get financial support by public educational funds, like the *Bildungsspass NRW* or the *Arbeitsamt*, please contact us in advance.

Course II - Telemac & Sisyphé in Full Depth

Tutors: Jean-Michel Hervouet, Catherine Villaret

(4 days advanced users training, English only)

Motivation: Even experienced users always struggle at the same decisions: Do I use the right turbulence model, advection scheme, solvers, transport models, et cetera and how do I understand the options? What happens below the surface? You know from your own tests which option speeds up, increases accuracy or smoothes the surface. But confidence comes with understanding.



To get the best possible insider explanations, I invited Jean-Michel Hervouet and Catherine Villaret, both decade long core developers of Telemac and Sisyphé. They can help you with background information, mathematics and experience.

Program

Telemac below the surface - Usability tips for advanced users (Jean-Michel Hervouet)

- Session 1
 - Saint-Venant equations and numerical techniques
 - Programming with Telemac subroutines
 - Inside Bief (structures, etc.)
- Session 2
 - Telemac-3D
 - A few words on turbulence
 - Advection schemes
- Session 3
 - Tidal flats
 - Parallelism
 - Linear solvers

- Session 4
 - Telemac: Open question & answer session

Sisyphé below the surface - Usability tips for advanced users
(Catherine Villaret)

- Session 5
 - Basic theory of bed load transport
 - Secondary currents
 - Slope effects
 - Bed forms & banks
- Session 6
 - Basic theory of suspended load
 - Advection/diffusion
 - Rouse profile
 - Convection velocity
 - Stratification effects,
 - Hindered settling
 - Sensitivity analysis
- Session 7
 - Long term simulations
 - Coupling with hydrodynamics in 2D-3D
 - Multi-grain sand grading
 - Application examples
- Session 8
 - Sisyphé: Open question & answer session

Prerequisites

Participants shall come with basic knowledge of TELEMAC.

Training Material

We provide a bootable 128GB SSD with a preinstalled and preconfigured [Live Ubuntu/Mint Linux](#). It includes an extensively tuned collection of programmes, with all manuals and examples plus docs. If you work during the training with this disk on your own laptop, we can be sure that all exercises work when you're back at home, without configuration marathons and messed up primary discs. Please understand that we do not sell software, as all included software is free anyway under LGPL and GNU license. Except the trial version of TECPLOT which are under their own copyright.

Dates & Cost

July 2017, 4th -7th

Fasanenschlösschen, Karlsruhe, Germany.

“Early birds” reduced fee for booking until 21 days before the training:	1590€
Regular Fee:	1890€

Tutors for 2017



Dr. Jean-Michel Hervouet

Father of the Telemac Project
and expert on the core numerics
since 3 decades.



Dr. Catherine Villaret

Worked more than 20 years at EDF-LNHE and HR Wallingford. She was responsible for the development of 2D and 3D sediment transport models in the TELEMAC-MASCARET system. Her UK based consulting company ComSOL helps you with coastal sediment problems and general estuary questions.



Dr. Uwe H. Merkel (UHM, Karlsruhe)

Researches and develops tailor made solutions for river flow problems since more than 15 years, including modules for Sisyphe, QGIS and Telemac-AD. Specialised on model uncertainties. Organizes the courses.