Open workshop

The spring school is organized as open workshop. It promotes the participants and is open for the interested general public. The spring school is organized as a non-profit event. The spring school is co-financed by the Polish National Agency for Academic Exchange under the STER program - Internationalization of doctoral schools (The event is co-financed with agreement No .PPI/STE/2020/1/00012/DEC/01 and organized under the honorary Patronage of the dean of the Faculty of Mechanical Engineering and Robotics, Krzysztof Mendrok).

Registration fee includes

Printed lecture notes, lectures by invited speakers, software tutorial mentored by *OpenLB* developers, 5x lunch, 2x dinner (including Spring School dinner), social excursion, all coffee breaks, certificate of participation

Pricing

	Early registration by 28. February 2022	Regular registration
Academia	€ 350	€ 500
Industry	€ 1,700	€ 1,850

Important dates

Spring School	21. - 25. March 2022
Early registration	28. February 2022

Poster session award

The award is aiming at supporting excellent students working in the field of LBM.

More information

Web: www.openlb.net/spring-school-2022
Email: springschool@openlb.net

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Spring School

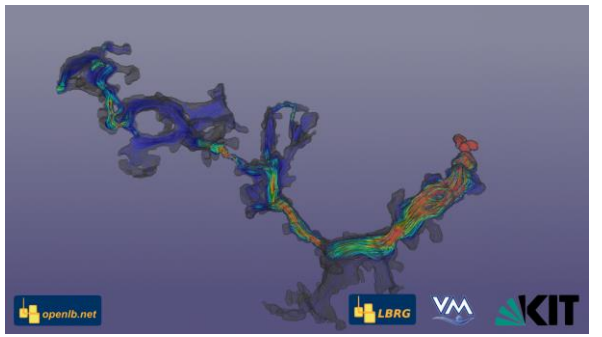
Lattice Boltzmann Methods

with *OpenLB* Software Lab

21. - 25. March 2022

Kraków, Poland

Open Workshop



www.openlb.net/spring-school-2022

Executive committee

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Host organizations

Karlsruhe Institute of Technology (KIT)

AGH University of Science and Technology (AGH)

OpenLB

The field of Lattice Boltzmann Methods

In recent years, Lattice Boltzmann Methods (LBM) turned into an established numerical tool for computational fluid dynamic (CFD) problems and beyond. The simulation of complex multi-physical problems benefits strongly from the comprehensive mesoscopic modelling underlying LBM and establishes LBM besides traditional numerical methods.

The rapid development in LBM - also driven by the emergence of massive parallel computer infrastructure - enables engineers to solve relevant problems for academia as well as for industry.

Target audience

The expected attendees are developers and researchers, from industry and academia interested to learn theoretical and practical aspects of LBM. The spring school addresses e.g. engineers, computer scientists, mathematicians and physicists as well as Master and PhD students. The course level is beginners in LBM. Based on their interest in CFD, this course provides a collaborative platform for LBM, both for developers and researchers.

Objective of the spring school

The spring school introduces scientists and applicants from industry to the theory of LBM and trains them on practical problems. The first half of the week is dedicated to the theoretical fundamentals of LBM up to ongoing research on selected topics. Followed by mentored training on case studies using *OpenLB* in the second half of the week, the participants gain deep insights into LBM and its applications. Emphasis is placed on the modelling and simulation of particulate fluid flows.

This educational concept is probably unique in the LBM community and offers a comprehensive and personal guided approach to LBM. Participants also benefit from the knowledge exchange during poster session, coffee breaks and an excursion.

Topic overview and preliminary agenda

	MONDAY, 21.03.2022
Morning	Registration, hand over spring school documents, introduction, LBM applications
Afternoon	Mesoscopic modeling: from micro to macro scale, LBM introduction, Chapman-Enskog expansion, target equations, boundary conditions, dimensionalisation
Evening	Poster session and dinner
	TUESDAY, 22.03.2022
Morning	LBM for turbulent flows, thermal flows, optimal control, radiative transport (light)
Afternoon	LBM for multi-phase and multi-component flows, particulate flows, efficient parallel implementation
Evening	Free, optional: help desk
	WEDNESDAY, 23.03.2022
Morning	Introduction *OpenLB,* preliminaries (*Linux*, compile, run in parallel, *ParaView*), converter, Exercise 1
Afternoon	Social event / excursion
Evening	Spring School dinner and poster award
	THURSDAY, 24.03.2022
Morning	Setup geometry, meshing, Exercise 2, place LB models, initial and boundary conditions, convergence
Afternoon	Exercise 3, get results: console, *VTK*, images, *Gnuplot*, functor concept, Exercise 4
Evening	Free
	FRIDAY, 25.03.2022
Morning	Advanced models, Exercise 5 and 6
Afternoon	Option 1: OpenLB for applicants: solve your own problem Option 2: *OpenLB* for developers: implement your own LB model

Software tutorial and requirements

In the computing lab sessions on Thursday and Friday, the participants are trained on practical applications, deploying the open source software *OpenLB*. Particular focus is placed on case studies, which are important to understand and verify the theory presented in the lectures earlier in the spring school. By the help of experienced tutors, the computing lab sessions also enable to set up *OpenLB* simulations for relevant problems. To guaranty personal tutoring and intensive exchange between experienced mentors and novices, the lab is limited to 50 participants.

The attendees are responsible to bring their own laptop equipped with the software

- *GNU c++ compiler 7.5 and higher*
- *OpenMPI 2.1 and higher*
- *ParaView*

Windows users prepare their laptop in advance following the *Technical Report* 5 (www.openlb.net/tech-reports).

Speakers (preliminary)

François Dubois, CNAM Paris, Université Paris-Sud, France

Timm Krüger, University of Edinburgh, United Kingdom

Halim Kusumaatmaja, Durham University, United Kingdom

Timothy Reis, University of Greenwich, United Kingdom

Fedor Bukreev, Nicolas Hafen, Julius Jeßberger,

Mathias J. Krause, Adrian Kummerländer, Jan E. Marquardt,

Stephan Simonis, Karlsruhe Institute of

Technology, Germany