



MathSEE Newsletter 1|2023

Dear Ladies and Gentlemen,

The crisis in the health sector, in the economy and with the ongoing war in Europe seem relentlessly continuing. In these difficult times, we would still like to bring you some positivity and progress happening within KIT Center MathSEE in the form of the first edition of our triannual Newsletter for the reporting period March – June 2023.

MathSEE Bridge Positions

In 2023, KIT Center MathSEE once again welcomed proposals from tandems of researchers bridging mathematics with an application field. Four new interdisciplinary projects were approved by the MathSEE steering board in April 2023 that will be propelled forward with a doctoral student position each and a funding of 81 T EUROS over the project duration of 2023 – 2025. Details of the funded projects are published on the MathSEE website and [can be accessed here](#). We hope that with the new MathSEE information dissemination efforts, we will receive several more applications in our next Bridge PhD round.

Great Success for CRC 1173: Wave Phenomena

On May 17th, 2023, DFG approved the [third funding period for CRC 1173](#). In the coming 4 years more than 100 researchers at KIT and Universities of Bonn, Stuttgart, Tübingen and Vienna will continue to investigate the fascinating mathematics of wave phenomena in cooperation with partners from physics, electrical engineering, geophysics, and biomedical engineering. Please visit the [website of CRC 1173](#) for more information on research within the project.

New junior research group INVACODA

Annika Oertel (IMK-TRO) has successfully established a junior research group entitled "Increasing the Value of Campaign Observations by Data Assimilation to Improve Convective Forecasting Ability" (INVACODA). The new group is embedded in the IDEA-S4S program of the German Weather Service (DWD; partner program with Italy) and is funded by the BMDV with about 1.4M€ for 4 years. The new group will focus on the evaluation of data assimilation experiments with the DWD system. In particular, the question is whether observations with the mobile measurement platform KITcube of the IMK-TRO can have a verifiable added value for thunderstorm forecasting.

Outstanding Publications

The following publication on newest applications of mathematical method were published in the time frame March – June 2023 by MathSEE researchers.

- Book on Applications of Data Assimilation and Inverse Problems in the Earth Sciences, Cambridge University Press, April 2023 <https://www.mathsee.kit.edu/1616.php>
- Journal Article on Dynamics of forced escape from asymmetric truncated parabolic well, Journal of Applied Mathematics and Mechanics, Feb. 2023
<https://onlinelibrary.wiley.com/doi/10.1002/zamm.202200567>
- Journal Article on Revealing the dynamics of ultrarelativistic non-equilibrium many-electron systems with phase space tomography, Nature Scientific Reports, March 2023.
<https://www.nature.com/articles/s41598-023-31196-5>

Introductory MathSEE Lecture Series

A new lecture series will be starting at KIT Center MathSEE! Every second Monday at 13:00 hrs starting 9 October a new insight into the best applications of mathematical methods in one of the SEE disciplines awaits you at the mathematics building 20.30, room 1.067. Lively discussions, new partnerships, lasting cooperations, great solutions are the vision behind the series of lectures.

If you would like to host the MathSEE lecture at your institute or if you would like to invite a guest in the framework of the MathSEE lecture series do let us know and we will be happy to coordinate a date with you. All information on the MathSEE lecture series will be available on the MathSEE website well before the start in October. So tune in and stay connected. <https://www.mathsee.kit.edu/index.php>.

MathSEE Symposium

The first in-person symposium hosted by KIT Center MathSEE on applications of mathematical methods in the SEE disciplines will take place from the 27th – 29th September at KIT Campus South, in the mathematics building 20.30 as well as lecture halls of the department of architecture 20.40. If you are applying mathematics in your research and would like to share your work with other Math or SEE scientists or just connect with the community then kindly register and [submit an abstract now](#) and be a part of the growing MathSEE network as the forum for applications of mathematical methods. Deadline for MathSEE Symposium is 31st May 2023.

IUGG Symposia on Mathematics in Geophysical Sciences

Between 11th and 20th July 2023, [several symposia on mathematical sciences](#), computer sciences and enabling data analysis will take place in Berlin in the framework of the IUGG General Assembly Meeting. The symposium on mathematics in geophysical sciences organised by MathSEE members will be held on July 12th focussing on the contributions towards sustainable society and environment. Leading experts will present their research advancing fundamental scientific understanding, monitoring and modeling of the Earth System. The [registration for the symposium is open](#) and participation is free of charge.

KIT Open Day

On 17th June [MathSEE will be present at the KIT open day](#) with a pavillon on the central event mile from 10 – 19:00 hrs showcasing the mathematical research at the center, engaging with interested public, motivating children and youth for mathematics and exchanging ideas with colleagues on promoting, networking, communicating science. The events will include 2 lectures on AI enabled weather forecasting (at 12:30 hrs) as well as mathematical methods in disease diagnosis (14:00 hrs). Several games, exhibits and posters displaying the current portfolio of applied mathematical activities at KIT Center MathSEE will further enrich the public experience.

Science Festival Effekte: Experimente Park

More mathematics dissemination and engagement with youth and children will continue at the closing event of the Science Festival Effekte at the Experiment Park in Karlsruhe from 12 – 18 hrs, together with our friends and partners the CAMMP group at SCC. For more Information please visit: <https://www.effekte-karlsruhe.de/home/>

KIT Graduate School Computational and Data Science (KCDS)

For the second time, KCDS has conducted a joint recruitment initiative to attract prospective PhD students in the field of Computational and Data Science to KIT. Positions for scientific staff were jointly advertised by several participating institutes in order to become more visible for applicants and to address high-profile candidates. This time, interested candidates were able to get to know the various doctoral projects at a "KCDS Virtual Open House" and thus obtain intensive information before applying. The process was successfully concluded with a virtual applicant day ("Selection and Matchmaking Event") on 16.5.2023 - suitable candidates were found for six of seven advertised positions.

CAMMP Workshop: Wind Energy

In view of climate change and the shutdown of the last nuclear power plants in Germany, renewable energies are becoming increasingly important for us. Especially in coastal regions and at sea, wind turbines are often found in so-called offshore wind farms. In the workshop, the students will take a closer look at the generated power of wind turbines, considering their shading.

Overall, the workshop offers students the opportunity to improve their modeling skills outside of regular mathematics classes and to apply their skills to a currently relevant topic. In addition, the impact and issues of offshore wind farms will also be critically discussed. To **book workshops** (CAMMP days) for school classes or courses, please visit <https://www.cammp.online/206.php>.

CAMMP Workshop: Spam Filter

The mailbox is often full of spam messages of all kinds. These unwanted mails can be filtered automatically with the help of mathematics. For this purpose, the incoming mails are sorted into two different classes "Spam" and "Ham".

In the workshop, students will learn Bayes' theorem and use it to create a spam filter and test it with real mails. The workshop is aimed at mathematics courses from grade 10 onwards and builds on

previous knowledge of relative and absolute frequencies, as well as conditional probabilities and two-stage random experiments. More information about the workshop can be found at <https://www.cammp.online/434.php>

Project course: “Mädels machen MI(N)T!” - Using math and artificial intelligence

Solving real-world problems Mathematics is only needed in school? Quite the opposite! Mathematics plays a central role in numerous applications in our everyday lives. For example, when Siri and Alexa process speech or when Netflix makes recommendations for movies. In many cases, methods from the field of artificial intelligence are used for this purpose.

This project course offers an introduction to these methods and thus provides insights into applied mathematics. The course takes place on ten afternoons from October to December 2023 and is aimed at girls from grade 10 who are interested in mathematics or computer science.

More information can be found at www.scc.kit.edu/forschung/16168.php. Registration is possible by sending an email to cammp@scc.kit.edu until September 29, 2023.

Scholarship “Simulierte Welten”

Starting in the fall of 2023, a scholarship for talented students will be offered again. Within the framework of the scholarship, students from the 10th grade onwards, supervised by scientists, will have the opportunity to spend a school year researching a project in the field of information science and natural sciences. There are various topics to choose from in the areas of simulation, high-performance computing and Big Data.

The application is open from August. Further information can be found here: www.scc.kit.edu/forschung/11727.php.

Upcoming Events and Important Dates

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| ○ KIT Open Day | 17 June 2023, 10h |
| ○ Effekte Festival: Experiment Zelt | 25 June 2023 |
| ○ KCDS Talk & 1. KCDS Birthday | 27 June 2023 |
| ○ IUGG Symposia on Mathematics in Geophysical Sciences | 12 July 2023 |
| ○ KCDS Summer School | 18 – 22 September 2023 |
| ○ MathSEE Symposium | 27 – 29 September 2023 |
| ○ MathSEE Members Assembly | 19 October 2023, 14h |

Membership and Newsletter

If you would like to become a member of MathSEE, please subscribe using the following link: <https://www.mathsee.kit.edu/765.php>

If you no longer wish to receive information from KIT center MathSEE, please unsubscribe from the mailing list by sending an email to mathsee@kit.edu