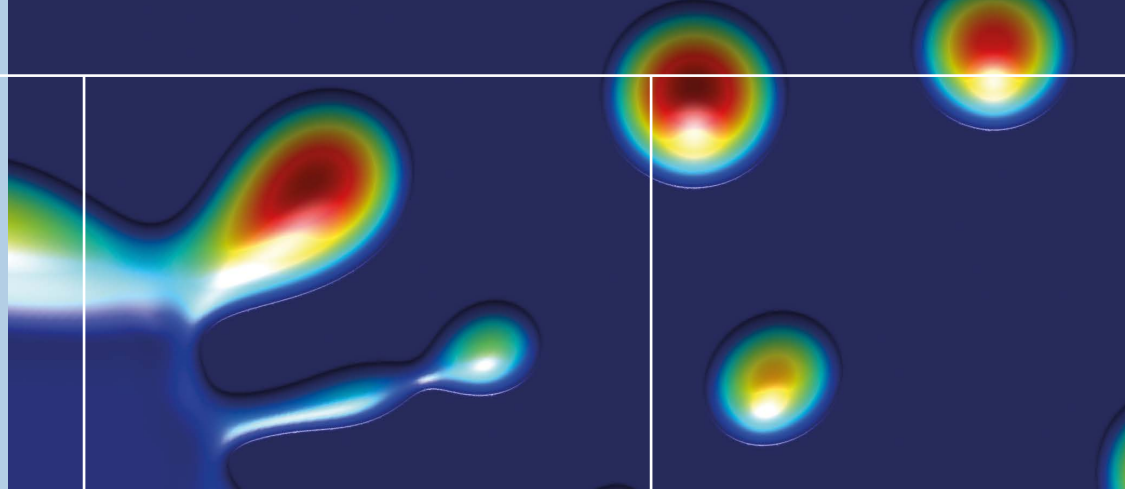




Weierstrass Institute for
Applied Analysis and Stochastics

May 2025



Selected success stories

- **Device-to-device mobile communications and stochastic geometry (longstanding cooperation with Orange S.A.)**
- **Deep learning-based surrogate modeling for time-dependent physical systems (cooperation with Robert Bosch GmbH)**
- **WIAS coordinated European Industrial Doctorate Network **Mathematics and Materials Science for Steel Production and Manufacturing (MIMESIS)****

Mathematics for the sciences

WIAS is a well-recognized partner of top-class institutions from a wide range of scientific disciplines. In this way, mathematical research results are transferred to the applied sciences, boosting or enabling innovation in these areas. The success of the highly interdisciplinary Leibniz Research Network **Mathematical Modeling and Simulation (MMS)**, coordinated by WIAS, in acquiring and implementing interdisciplinary research projects is a prime example in this regard. leibniz-mms.de

International Dimension

- The excellent research at WIAS is conducted with a highly international scope
- WIAS is an active member of the **European Consortium for Mathematics in Industry (ECMI)** ecmiindmath.org
- WIAS hosts the Secretariat of the **International Mathematical Union (IMU)** mathunion.org

Solutions for Complex Problems

Weierstrass Institute
for Applied Analysis and
Stochastics

Leibniz
Association

Transfer

*"Companies that collaborate with scientific institutions are more successful in launching new products and achieve higher sales shares with them. This effect is particularly strong for products that are introduced as market or global market novelties"*¹

Mathematics underpins and drives almost every field of innovation and science. Its universality fosters breakthroughs and insights in energy, healthcare, modern materials as well as social sciences and climatology, among others. It provides theoretical foundations for machine learning and contributes significantly to increasing the safety and efficiency of AI systems. Building on its very ambitious research agenda, the Weierstrass Institute has been contributing significantly to these areas and many more.

¹ ZEW policy brief No. 25-02, Bastian Krieger et al., Feb. 2025 (in German)



Mathematical

WIAS conducts cutting-edge mathematical research for the solution of complex application-driven problems in technology, science, and business, for the advance of society.

The Institute

The ingenious combination of a broad range of methods from statistics, stochastics, partial differential equations, numerical mathematics, and optimization is one of the key strengths of the Institute. With this profile, available know-how for cooperations, and support for practitioners from economy and science, WIAS offers an internationally unique spectrum of skills and services.

The following main **areas of application** are particularly supported:

- **Energy: Technology, Markets, Networks**
- **Flow and Transport**
- **Materials Modeling**
- **Quantum- and Optoelectronics**
- **Optimization and Control in Technology and Economy**
- **Quantitative Biomedicine**



wias-berlin.de

Core competencies

WIAS' expertise covers all aspects of the entire problem-solving process, ranging from mathematical modeling to the analysis of the model, algorithm design, and software development, to furnishing concrete numerical solutions. We provide scientifically-based analysis, custom-tailored intelligent consulting, as well as workable problem solutions including support for their implementation.

Transfer paths and activities

- **Research and development projects – From joint to contractual research**
- **Public-private partnerships (joint participation in research programs, collaborative research activities, and publications, etc.)**
- **Study groups with industry (from feasibility studies to co-creation or R&D projects)**
- **Development and licensing of scientific software**
- **WIAS encourages spin-off initiatives and offers entrepreneurs a wide range of support.**

Knowledge Exchange

Scientific software

Within its versatile scientific projects, WIAS regularly develops **scientific software** for solving highly complex application problems **using its state-of-the-art mathematical research results**. Through its broad range of activities, WIAS experiences a strong demand from science and industry for the (re)use and transfer of such software in projects with an extremely high degree of innovation. For accommodating these needs, WIAS offers a flexible range of customized software licenses.

In this context, highly competitive research software engineering as well as adherence to the FAIR principles for research software (**FAIR** = Findability, Accessibility, Interoperability, Reusability) are of particular importance. For our customers this ascertains dedication to good scientific practice as well as a stringent quality assurance for our cutting-edge software modules.



The Berlin Study Group with Industry

The central goal of this week-long workshop-like activity is furnishing mathematical feasibility studies for application-driven problems raised by participants from industry. WIAS organizes such activities by identifying highly relevant topics together with industry and by inviting a group of industrial/application partners along with a group of highly dedicated mathematicians.

Working groups are formed around specific topical areas for addressing the respective problem. By the end of the workshop, the outcomes are discussed with company representatives. Often, follow-up activities such as co-creation projects, public-private partnerships or classical R&D projects emerge.

Co-Creation