

Fraunhofer Institute for Industrial Mathematics ITWM



The core competence of Fraunhofer ITWM is Mathematics as language to formulate models for technical systems. Since its foundation in 1995 the ITWM has shown great success in building mathematical bridges between applied sciences and concrete applications. Currently, 200 employees are working at the ITWM; the institute's budget adds up to 16 Mio Euro in 2009. The institute belongs to the 57 institutes of the Fraunhofer-Gesellschaft, which is the largest organization for applied research in Europe, thus contributing to national and international competitiveness.

Computer simulations have become an indispensable tool for the design and optimization of products, services, and communication and working processes. Real models are substituted by virtual models. As a raw material for the models and a key technology for computer simulations, mathematics represents the foundation of the bridge towards the world of simulation, which has been established in almost every field of society and economy. An increasing number of small and medium-sized enterprises use simulation for cost reduction. The Fraunhofer ITWM especially supports these companies by consulting and computer performance. The companies are profiting on the market due to the application of simulations as a sign for innovation and quality assurance of their products. Of course, we are also cooperating with large enterprises, mainly in the fields of automobile construction, engineering, textile industry, micro-electronics, banks, and computer industry. We meet complex challenges in technology, logistics, communication, and finances by the application of modern mathematical methods and we are also further developing applied mathematics by innovative ideas, creating practical solutions in cooperation with industrial partners. Integral components of these solutions are consulting with respect to R&D problems, support with respect to the application of high performance computer technology, and the development of especially tailored software solutions. The intention of the ITWM is not only to build the bridge between the real and the virtual world, but also to provide a connection between mathematical research at the universities and the practical application of the results. Close cooperation with the Department of Mathematics of the Technical University of Kaiserslautern therefore is especially important for the ITWM. The ITWM is one of the leading partners for mathematics in industry.

Internationality at the ITWM has two perspectives: an internal one and an external one. Apart from numerous informal contacts to partners from foreign countries, firm cooperation has been established with two foreign institutes: in September 2002, the Fraunhofer-Chalmers Research Centre for Industrial Mathematics (FCC) was founded in Gothenburg in Sweden, representing the Swedish partner institute of the ITWM. Additionally, in 2008 the Fraunhofer-Cambridge Finance Alliance was founded; the partner of ITWM is the financial mathematics group at University of Cambridge. The ITWM is also related to the Indian Institute of Technology in Madras and the Texas A&M University. In each case, both partners profit from close contact because the cooperation facilitates each institute's access to the market of the partner country. The cooperation with respect to their competences enables the partners to cover a considerably larger market segment. Fraunhofer ITWM also is member of numerous international networks especially one of the founding members of ECMI, the European Consortium for Mathematics in Industry, an organization with the aim to strengthen the interaction between universities and research groups in industry and to promote the use of mathematical models in industry. Internally, internationality is also a very important aspect at the ITWM: the percentage of scientists from foreign countries is more than 20 %, among PhD-students it is even more than 60 %. One reason is the close cooperation with the Department of Mathematics of the Technical University of Kaiserslautern, where many lectures are held in English.



Fraunhofer Center Kaiserslautern, exterior view

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Research Areas

- Transport Processes
- Flow and Material Simulation
- Image Processing
- System Analysis, Prognosis and Control
- Optimization
- Mathematical Methods in Dynamics and Durability
- High Performance Computing

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