

PRESS RELEASE

Fraunhofer ITWM at FILTECH 2024

Digital Twins for Filtration

Twins never come singly – digital twins in separation technology, on the other hand, are often loners. This is because a digital image of a specific production step or component is usually created without considering the entire process chain. Research and developments by Dr. Ralf Kirsch, and the »Filtration and Separation« team at the Fraunhofer Institute for Industrial Mathematics ITWM, are about to change this and Kirsch will be presenting new approaches for the simulation-based improvement of filter technology at FILTECH 2024 from November 12 to 14, 2024. In addition, the Fraunhofer ITWM team will bring other research topics to Cologne.

Kirsch's keynote speech, titled »From Process to Operation: Digital Twins for Filtration« uses examples to illustrate how digital twins for individual process steps can be linked to form a digital process chain and how the entire product development process benefits from this holistic approach. Even the best filter material can only realize its full potential if its favorable properties are retained during processing and the operating conditions are as intended. Predicting the effects of the individual process steps on the end product using mathematical methods while keeping the computational effort within reasonable limits is an exciting challenge.

Numerous Experts from Kaiserslautern on Site

FILTECH 2024 offers the opportunity to learn more about various application areas of simulation technology. Topics such as the deformation of filter media during operation, the next generation of nonwovens for protective masks, the service life of coolant filters for electric mobility, and reactive flows in porous media will be discussed. In addition to Kirsch, other researchers from the departments »Flow and Material Simulation«, »Transport Processes« and »Image Processing« at the Fraunhofer ITWM will be on hand to give talks on their respective special topics. The Fraunhofer Institute offers a wide range of simulation tools and services for processes and products. These include the optimization of filter media and elements in terms of efficiency and service life, as well as the computer-aided optimization of the entire process chain from fiber to filter.

An Overview of the Conference Contributions of the Fraunhofer ITWM:

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Tuesday, November 12, 2024

- Dr. Pavel Toktaliev, Dr. Ralf Kirsch, Dr. Maxime Krier, Dr. Dariusz Niedziela and Dr. David Neusius from the »Flow and Material Simulation« department will give a lecture in session L 03 from 4:45 p.m. on the topic of »Multiscale Simulation of Polymer Melt Flow Through Wire Mesh Filters«

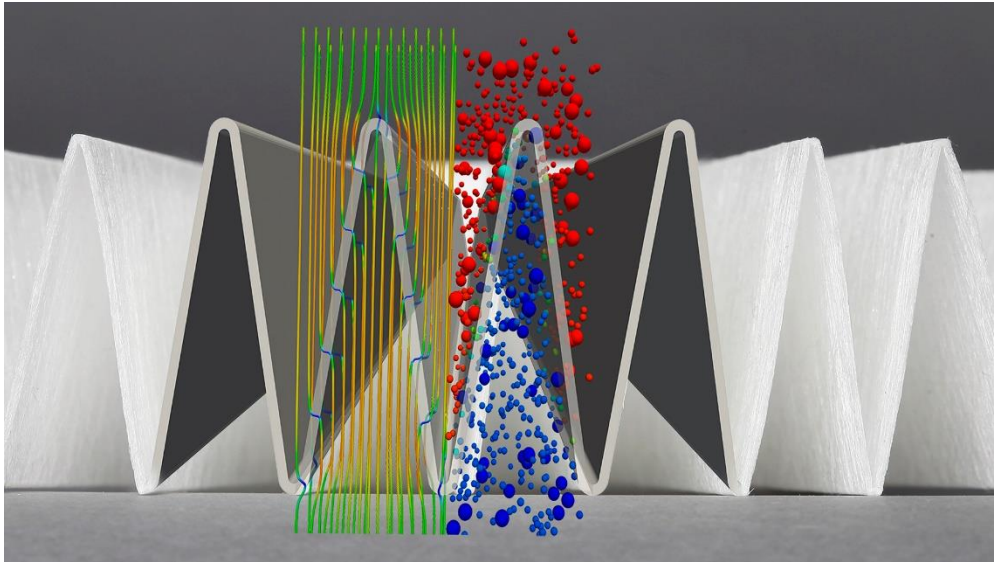
Wednesday, November 13, 2024

- KEYNOTE Dr. Ralf Kirsch, team leader of »Filtration and Separation« in the »Flow and Material Simulation« department, will be giving the K04 keynote lecture at 1:00 p.m. in Room 1 on site. The title of his lecture is »From Process to Operation: Digital Twins for Filtration.«
- Dr. Maxime Krier, Dr. Ralf Kirsch, Dr. Julia Orlik and Dr. Stefan Rief from the department »Flow and Material Simulation« will present in session F07 from 4:45 p.m. on the topic »Fast Computation of the Mechanical Properties of Filter Fabrics and Application to Flow-induced Deformation«
- Dr. Walter Arne, Sergey Antonov and Dr. Dietmar Hietel from the »Transport Processes« department will be speaking in session G06 from 9:00 a.m. on »Next Generation FFP 2 Part I: Optimization of Melt-blown and Hydrocharging Processes«
- Dr. Ralf Kirsch and Christian Mercier from the »Flow and Material Simulation« department, together with their colleagues Michael Godehardt and Dr. Katja Schladitz from the »Image Processing« department, will give a presentation on »Next Generation FFP 2 Part II: Material Characterization, Design and Assessment of Performance« in session G06 from 9:00 a.m.

Thursday, November 14, 2024

- Christian Mercier, Dr. Ralf Kirsch and Dr. Sebastian Osterroth from the »Flow and Material Simulation« department will present on the influence of material compression on the mechanical and electrostatic capturing efficiency of filter media in session G14 from 1:00 p.m.

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The simulation methods of the researchers at the Fraunhofer ITWM connect real filter technology with the digital world: a pleated air filter medium can be seen here with its digital twin, for which the air flow and particle distribution are calculated.

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About the Fraunhofer Institute for Industrial Mathematics ITWM

The Fraunhofer Institute for Industrial Mathematics ITWM in Kaiserslautern is one of the largest research institutes for applied mathematics in the world. We see it as our task to further develop mathematics as a key technology and to provide innovative impulses. Our focus is on the implementation of mathematical methods and technology in application projects and their further development in research projects. The close cooperation with partners from industry guarantees the high practical relevance of our work.

Their integral building blocks are consulting, implementation and support in the application of high-performance computing technology and the provision of customized software solutions. Our various areas of expertise address a wide range of customers: the automotive industry, mechanical engineering, the textile industry, energy and the financial sector. This also benefits from our excellent networking, for example in the Simulation and Software-based Innovation Center.

FRAUNHOFER INSTITUTE FOR INDUSTRIAL MATHEMATICS ITWM**About the Fraunhofer-Gesellschaft**

The Fraunhofer-Gesellschaft, based in Germany, is the world's leading organization for application-oriented research. With its focus on future-oriented key technologies and the utilization of results in business and industry, it plays a central role in the innovation process. As a guide and driving force for innovative developments and scientific excellence, it helps to shape our society and our future. Founded in 1949, the organization currently operates 76 institutes and research facilities in Germany. More than 30,000 employees, most of whom are trained in the natural sciences or engineering, work on the annual research volume of 2.9 billion euros. Contract research accounts for 2.5 billion euros of this total.

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