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THREAD Doctoral Program Picks up Speed

Guest Scientist at Fraunhofer ITWM and Virtual Network-wide Training Promote Scientific Exchange

International networks enrich the scientific exchange. Within the framework of the European Union's THREAD doctoral program, this is currently lived out twice at the Fraunhofer ITWM: In July, the institute welcomes THREAD doctoral student Denise Tumiotto, who will spend four weeks as a guest scientist in the field of "Mathematics for Vehicle Development". In addition, the first network-wide training took place at the beginning of the month, which the 14 PhD students of the program from eight European countries completed together.

Since the beginning of July, Denise Tumiotto has been a guest at the Fraunhofer ITWM. The doctoral student is doing her PhD at the Martin-Luther-University Halle-Wittenberg on the topic of time integration. "The idea of my dissertation is to develop a fast and robust solver for the Cosserat rod model. For this purpose, I am investigating currently used algorithms. I hope that a better understanding of these algorithms will lead to a faster and better solution," says Tumiotto describing her topic.

Insights Into Industrial Applications at the Fraunhofer ITWM

She is currently completing her first four-week "secondment" in the "Mathematics for Vehicle Development" department of the Fraunhofer ITWM. This is the name of the one-month periods that the doctoral students spend within the network at different universities, research institutes and industrial partners in order to gain new insights into scientific as well as industry-oriented research.

Tumiotto's goal at the Fraunhofer ITWM is to benefit from the existing expertise in software tools for virtual product development and the measurement of mechanical properties of cables and cable bundles. Of particular interest to her is the focus on virtual product development with specially developed software tools for assembly planning and the interactive simulation of flexible structures. At the ITWM spin-off "fleXstructures", Tumiotto also learns details about the various modules of the simulation software IPS and tests its features using current application examples from industry.

"The work at the ITWM is very interesting for me. It is the first time that I am working in a research centre and not at a university. The atmosphere is different, but in a positive way. In the institute it is possible to see the application of research, which is not normally possible in an academic environment," says Tumiotto about her experience at the Fraunhofer ITWM.

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Close Cooperation With THREAD PhD Students on Site

Tumiotto's stay in Kaiserslautern is also the start of a close collaboration with Davide Manfredo, who has been a PhD student in the THREAD subproject at Fraunhofer ITWM since April 2020. "The collaboration with Davide is a wonderful part of the experience here at Fraunhofer ITWM. We not only attend the courses planned by the project together, but we also discuss their contents. Furthermore, Davide and his supervisors Joachim Linn and Vanessa Dörlich explain to me their approach to the Cosserat rod model. They teach me how the model works and how they solve the model in space to arrive at a static solution".

The First Network-Wide Training Within THREAD

At the beginning of Tumiotto's secondment, the first virtual network-wide training took place within the framework of THREAD on the topics "Fundamentals of beam theory and flexible multibody dynamics, parameterisation of rotations". It addresses all 14 PhD students of the THREAD program from eight European countries.

The network-wide training includes courses on the fundamentals of nonlinear beam theories and on the fundamentals of multibody dynamics. Besides the purely scientific courses, there are also courses on soft skills. Tumiotto finds these very useful: "Soft skills training is usually not very much considered during a PhD project, but I think they are crucial for any researcher."

About THREAD – The PhD Program of the European Union

Within the framework of the EU-funded doctoral student network «THREAD – Joint Training on Numerical Modelling of Highly Flexible Structures for Industrial Applications», a total of 14 young researchers are working at twelve universities and research institutions from eight European countries. The EU will provide €3.6 million in funding for the doctoral positions.

The research projects focus on the question of how thin flexible structures such as ropes, cable bundles or hoses can be better modelled and simulated on the computer in the future. The application spectrum of the simulation models developed ranges from cable cars for ski lifts and cable harnesses in automotive engineering to medical endoscopes or hoses for maritime applications, for example on drilling platforms.

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Guest researcher Denise Tumiotto and ITWM PhD student Davide Manfredo jointly participate in the first virtual network-wide training of the EU PhD program THREAD.

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Press contact

Swenja Broschart
Fraunhofer Institute for Industrial Mathematics, ITWM
Fraunhofer-Platz 1
67663 Kaiserslautern
Telephone: +49 631 31600-4046
presse@itwm.fraunhofer.de
www.itwm.fraunhofer.de

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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 industrial mathematics worldwide. We see our task in further developing mathematics as a key technology and providing innovative impetus. 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 components are consulting, implementation and support in the application of high-performance computer technology and the provision of tailor-made software solutions. Our various competencies address a wide range of customers: automotive industry, mechanical engineering, textile industry, energy and finance. This also benefits from our good networking, for example in the High performance center "Simulation- and software-based innovation".

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