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High-level EU funding: MLU receives grant for an international PhD-network

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The Institute of Mathematics at the Martin Luther University Halle-Wittenberg (MLU) is to coordinate a new European Training Network (ETN) for doctoral students. The 14 research projects will examine how complex mechanical systems can be better modelled and simulated on the computer. The European Union will provide around 3.6 million euros over four years as part of the Horizon 2020 programme. MLU is joined by eleven other universities and research institutions from eight countries in Europe. The project will kick off with a meeting on 24 and 25 October 2019 in Halle.

At first glance, ski lifts, cable harnesses for automotive engineering and medical endoscopes appear to have little in common, however they do share one special characteristic: "They all consist of very flexible and moving components that resemble hoses or ropes," says project coordinator Professor Martin Arnold from the Institute of Mathematics at MLU. In practice, this makes it difficult to accurately predict their behaviour. Until now, companies have relied on their previous experience when developing new products and projects or when optimising existing hardware, says Arnold.

This is where the new ETN "Joint Training on Numerical Modelling of Highly Flexible Structures for Industrial Applications" comes in. Participants of the network are located in Belgium, Germany, France, Croatia, Norway, Austria, Slovenia and Spain. The aim is to create a so-called "digital twin" for these applications, which allows to simulate the system's behaviour by computer experiments. The main objective is to not only model the behaviour of individual components, but also to represent the properties of the entire system. This allows many simulations to be conducted during the development phase and, for instance, also allows material wear to be calculated.

The research projects make use of so-called beam theory, a classic model of mechanics. How to apply the model to highly complex technical systems is a question that is set to be answered by the doctoral candidates. The spectrum of work ranges from applied mathematics and mechanics to industrial research. The mathematical principles for this are being examined in Halle and Trondheim, Norway, while other projects are devoted to specific industrial applications.

In addition to receiving academic training, the 14 doctoral students will also complete a three-month internship at a non-academic partner institution, usually a company. Guest stays at the partner universities cooperating in the network are also part of the training.

ETNs are a funding scheme of the European Commission's Marie Skłodowska Curie Programme which is part of Horizon 2020. The aim is to equip young researchers with the skills they will need for a career in both scientific and non-scientific environments. Therefore, 13 non-academic institutions are also involved in the projects alongside European universities and non-university research institutions. Competition to acquire a network is extremely high: in 2019, only 103 of the 1,341 evaluated project proposals were funded.

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