Press Release

24 May 2017

Transforming an academic concept into industrial applications: double award for Centrale Nantes researchers

Having previously secured major ERC funding to undertake their research, Nicolas Moës (Dean of Research at Centrale Nantes) and researcher Gilles Marckmann have been awarded a grant of €150,000 to develop the industrial applications of their research.

Centrale Nantes researchers Nicolas Moës and Gilles Marckmann's research work seeks to understand and reliably predict damage to materials and, in particular, crack creation and propagation.

This subject is of vital importance in the mechanics of materials: it makes it possible to evaluate the lifetime of a product such as an automobile part. It is also of major interest in the nuclear and aeronautical industries: where it allows the effect of exceptional loads on structures to be understood, thus preventing the risks of leakage and optimizing maintenance cycles.

Nicolas Moës submitted a project to the European Research Council (ERC) in 2011 entitled "New Frontiers for Computational Solid Mechanics based on eXtended Level Set representation. Applications to damage mechanics, contact mechanics and stress analysis."

The project was selected and he was awarded a grant of almost two million euros to carry it out with his team. This resulted in a new method - Thick Level Set (TLS) - simulating the propagation of a crack on a sound material until it breaks, while taking into account the constituent characteristics of the material.

After consulting technology transfer centres, the researchers were able to pinpoint new market potential for this method linked to a new set of technical problems.

Chalk breakage under torsion

Nicolas MOËS and Gilles Marckmann then submitted a proof of concept proposal to the European Research Council. This call was addressed to ERC grant holders with the aim of awarding top-up funding to explore the commercial or innovation potential of the results of their EU funded research.

The two Centrale Nantes researchers were awarded the proof of concept grant on 17 May 2017 thanks to their industrialization project (named MATCRACK) using the TLS method.

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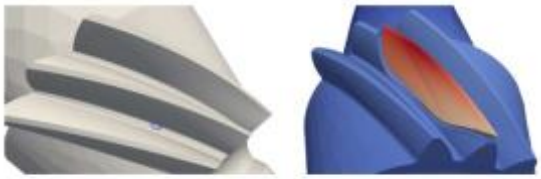

Spiral bevel pinion gear: initial crack location (left) and final crack opening (right)

figure 1 : branching of crack path with the TLS method

Only 7 French projects feature in the 51 selected by the European Research Council. MATCRACK is also the first project in the Brittany - Pays de la Loire region to have obtained such funding. ERC president, Jean-Pierre Bourguignon, was in Nantes on May 24th to meet with the ERC grant-holders in the West of France, on the occasion of the ERC's 10th anniversary.

Nicolas Moës

Nicolas Moës, Centrale Nantes professor, was appointed Dean of Research in 2017. He has headed up the "Modelling and Simulation" research group at the Institute for Research in Civil and Mechanical Engineering (CNRS, Centrale Nantes, University of Nantes) since 2004.
Having obtained his PhD from the *Ecole Normale Supérieure de Cachan* in 1996, he pursued post-doctoral research at the University of Texas and then at Northwestern University, where in 1998 he began his research work on the X-FEM method which simplifies crack propagation calculations. He joined Centrale Nantes in 2001, and the *Institut Universitaire de France* in 2007 - a network of university excellence throughout France - and in 2011 he was awarded an ERC Advanced Grant.
Recipient of a CNRS Silver Medal in 2014, his research themes are contact mechanics and numerical simulation of crack creation and propagation in different materials.

Gilles Marckmann

Gilles Marckmann is a research engineer at Centrale Nantes and holder of a PhD in Mechanical Engineering. His main fields of investigation are the calculation of structures and the modelling of materials. He works on advanced projects in mechanics and the development of digital simulation tools.

See the XLS project page: www.ec-nantes.fr/erc-xls-project-129646.kjsp?RH=1488442609375

About Centrale Nantes

Centrale Nantes is a French engineering school and member of the Ecoles Centrale Group. Its graduate, master and PhD programmes are based on the latest scientific and technological developments and the best management practices. Founded in 1919, Centrale Nantes' 40-acre campus welcomes 2320 students, including 1550 graduate students, 150 Executive Education and degree apprenticeship students, 240 PhD students and 380 Master and Advanced Master students.

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