



Press Release

Grenoble, April 4, 2022

Launch of the Oxalia Chair: Designing more efficient hydraulic structures and protecting the coastline

Fondation Grenoble INP, supported by Artelia, has just launched a new Chair for Industrial Excellence: Oxalia. The Chair is backed by the Laboratory of Geophysical and Industrial Fluid Flows (LEGI – Grenoble INP/CNRS/UGA) and by Grenoble INP – Ense³, UGA, the transitional engineering school specialising in energy, hydraulics, and the environment.

The research will involve predicting the dynamics of multiphase flow, i.e. water flow in the presence of solid particles or air bubbles, which control the erosion of water infrastructure, rivers and the coastline. Objective: To create innovative digital models to design more efficient hydraulic structures and solutions to prevent river and coastal erosion.

According to Julien Chauchat, holder of the Oxalia Chair, lecturer at Grenoble INP - Ense³, UGA and researcher at LEGI*: *"Climate change, a soaring population and growing urbanisation all have an impact on coastal morphology, but also on water infrastructure, such as bridges and dams. For example, most of the world's bridge collapses are caused by the phenomenon of scouring, i.e. loss of sediment due to disruptive currents from a natural or artificial obstacle. The economic and strategic stakes are huge. Our research will allow us to understand the dynamics of the natural environments around us, to model them in order to better predict their evolution, and to construct more sustainable infrastructures by reducing human and material risks."*

Multiphase flow prevention model

The problem is complex: it requires an understanding of the physics of a turbulent flow at the level of tens or even hundreds of meters, where the presence of only a few hundred microns will play a fundamental role. The interaction between turbulent structures, vortices and air bubbles or solid particles still poses a challenge for fundamental research today and gives these flows a multiscale character.

To simplify calculations, scientists model what happens at a smaller scale and then build up to larger scales through Russian doll-style models. Experiments will then play a key role in validating models. To do this, LEGI has state-of-the-art equipment at its disposal, such as a



wave flume, a tilting flume, and the Coriolis¹ platform. As for Artelia, the group boasts a world-renowned hydraulics testing laboratory in Pont-de-Claix, France.

Training responsible engineers

The results of the Oxalia Chair's research will be made available to students as part of a new course developed by Grenoble INP - Ense³ and Julien Chauchat for third-year students, dedicated to advanced simulation tools for mechanics and the environment.

The Chair will promote discussions and reflections on environmental hydraulics between researchers, PhD students, students of Grenoble INP and the Industry. A Science Day will also be organised each year to present the progress made.

Artelia and Grenoble INP-Ense³ have maintained close ties for several years. The company helps design the teaching programs and works with students in their areas of expertise every year. Around 100 Artelia employees were trained at Grenoble INP - Ense³ and the company hosts 10 to 15 interns from the school every year.

About

Fondation Grenoble INP, inspiring a sustainable society through progress and science

The Grenoble INP Foundation's mission is to support the ambition and development strategy of Grenoble INP - UGA in terms of scientific excellence, international influence, and shared success (citizenship and equal opportunities). Since its creation in 2010, the Foundation has carried out innovative projects to further the development of Grenoble INP - UGA. It hosts chairs of excellence to advance knowledge and science in partnership with companies; it enables students to carry out projects that are important to them within the framework of the Foundation's values: citizenship, excellence and international.

www.fondation-grenoble-inp.fr

In figures

- More than 13.3 M€ of sponsorship mobilized
- 3 sponsorship programs developed
- 12 chairs of industrial, research and teaching excellence,
- 871 scholarships distributed, 92 association and school projects financed for a total of €2.6M

About

Grenoble INP – Ense³

Energy, water, and the environment are the major societal issues of today and tomorrow. The vision of Grenoble INP - Ense³ is to train engineers and PhD graduates in order to develop new methods of producing, transporting and storing energy, to invent the housing and transport of the future, and to ensure a water supply for as many people as possible, in both quantity and quality.

Ense³ is located in the GreEn-ER building at the heart of the GIANT innovation campus, home to 1,500 students. The site aims to strengthen the DNA of Grenoble, namely the threefold focus: Research-Training-Industry. www.ense3.grenoble-inp.fr

About LEGI

¹ <https://www.legi.grenoble-inp.fr/web/spip.php?article757>



The Laboratory of Geophysical and Industrial Fluid Flows (LEGI) is a Joint Research Unit of CNRS, Grenoble INP-UGA and UGA. LEGI conducts a wide range of activities with a common set of core skills: research in fluid and transfer mechanics. LEGI develops:

- *Fundamental lines of research to address the major scientific challenges that fluid mechanics still faces today (turbulence and waves, multiphase and multiphysics, thermal and biochemical transfers, fluid-structure couplings).*
- *For this, many advanced scientific methods are used (theoretical analysis and modelling, digital simulation and high-performance computing, experimental equipment and instrumentation).*
- *The expertise developed at LEGI allows us to contribute to the development of various applications at the heart of today's major societal issues (Environment and Climate, Renewable Energy, Process Engineering, Health, etc.).*

About Artelia

Artelia is an international and multidisciplinary consulting, engineering and project management group in the mobility, water, energy, construction and industry sectors. With 6,100 employees, Artelia is a key player in Europe, with a turnover of €745 million in 2020 and a presence in over 40 countries in Europe, Africa, the Middle East, Asia Pacific and the Americas. Artelia is 100% owned by its managers and employees.

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