

MASTER THESES

Academic year **2021-2022**

*The topics listed below correspond more to **themes** in which master theses can be realized, than to a detailed description of topics. Depending on the interest of the students, more theoretical or instead industry-related topics will be developed. Some of the proposed themes are more convenient for an internship, to be made before the master thesis.*

*The themes proposed are preferably **accessible mainly to students in engineering physics and in electromechanical engineering.***

11. Review and sensitivity analysis of a Monte-Carlo model for assessing risks of ice fall from wind turbines (in collaboration with Tractebel Engie)

P. Geerinck (pascal.geerinck@tractebel.engie.com), P.E. Labeau (pelabeau@ulb.ac.be), P. Henneaux (phenneau@ulb.ac.be)

For master thesis and internship



Adobe Acrobat
Document



PROPOSAL FOR MASTER THESIS AND INTERNSHIP

- Review and sensitivity analysis of a Monte-Carlo model for assessing risks of ice fall from wind turbines

Context

In the context of energy transition, the development of wind energy projects situated in an industrial environment or close to cities is a preferred option in regions with high population densities, since it represents some major advantages related to landscape and noise pollution, NIMBY (*Not In My Backyard*) and the availability of an electrical connection to the grid. On the other hand, it also represents a drawback in terms of safety during winter conditions due to the presence of people in the vicinity of the wind turbine where ice accretion on the wind turbine blades represents a major risk as ice fall may cause incidents, even lethal accidents. To be able to access this risk Tractebel developed a risk-based decision icefall-model using empowered by Monte-Carlo engine. This model contains a big number of stochastic parameters related to physical phenomenon's such as ice accretion, wind climate, ice shedding, trajectory model parameters, human exposure model parameters, etc.

Objectives of the master thesis

The objective of the master is to perform an in-depth sensitivity analyses of the available model (the model is fully described and runs under a Matlab environment). The aim is to have insight in those parameters which are critical in relation to the used risk measures and so need special attention in the modelling. It is proposed to use a 2-step approach: the first step would be a critical review of the developed model to have a clear insight of the different constituting components and eventually propose improvements, the next and main step is the detailed sensitivity analyses of the model. If needed an iteration can be performed towards step 1. Based on the result of these analyses it may also be an opportunity to optimize the Monte-Carlo sampling method that is the core of the modelling.

To have the possibility to be in close contact with the developers, have easy access to the code it is highly recommended to combine the subject of the master thesis with an internship in our offices in Brussels.

Contact: pascal.geerinck@tractebel.engie.com



We are a global community of imaginative experts engineering a carbon-neutral future.

Tractebel is a global engineering company delivering game-changing solutions for a carbon-neutral future. Insights gathered during our more than 150 years of experience in energy, urban, nuclear and water projects combined with local expertise allow us to tackle complex future-oriented projects.

By connecting strategy, design, engineering and project management, our community of imaginative experts helps companies and public authorities create positive impact towards a sustainable world, where people, planet and profit collectively thrive.

With offices in Europe, Africa, Asia, the Middle East and Latin America, the company registered a turnover of 581 million Euros in 2020. Tractebel is part of the ENGIE Group, a global reference in low-carbon energy and services.

AREAS OF EXPERTISE

ENERGY

- Renewables (Solar, wind, Biomass)
- Digital & Decentralized Energy
- Thermal Energy
- Transmission & Distribution
- Natural Gas, LNG, Green Gas & E-fuels
- Offshore Energy
- Industrial process
- Hybrid systems with sector coupling

URBAN

- Cities & Territories
- Transport Infrastructure
- Buildings

NUCLEAR

- Advanced Technologies
- New Build
- Plant Operation Support
- Radwaste Management
- Decommissioning and Dismantling

WATER

- Water Resources and Climate Change
- Irrigation
- Water Supply and Sanitation
- Desalination
- Hydropower
- Reservoirs and Dams
- Flood Protection
- Waterways
- Coasts and Estuaries
- Ports and Marine Facilities

KEY FIGURES

- Presence in more than **70 countries**
- Projects developed in over **160 countries**
- 5,000 employees**
- € 581 million** turnover
- More than **70 technical publications/year**
- High Safety Standard: **Frequency Rate 0.7**



PROJECT LIFE CYCLE

Tractebel adds value throughout the complete cycle of a project:

