[FIRMEST]

Workshop 1: Digital twin methods and lifetime assessment using data-driven methods

15/10/2025 : Vrije Universiteit Brussel

Morning : Talks (Open to all, Online possible)

- **09h30 – Welcome**

- **09h45 – Introduction to Firmest**
  - The FIRMEST research project is briefly introduced by the project partners. Short summary of the project objectives and preliminary results.

- **10h00 – OWI metadatabase : organizing design data (VUB)**
  - The OWI-metadatabase is introduced as a tool to store relevant information on the structural properties of an offshore wind turbine. Including the geotechnical, geometrical and fatigue properties of the assets.
  - An API is used to quickly access the information of any asset in the portfolio, allowing to quickly answers as "what will ultimately drive my fatigue life?"
  - The talk is concluded by a short round-table, what information is best stored for your application?

- **10h30 – Digital twins for structural dynamics of offshore wind turbines (VUB)**
  - The digital twin is a widely use term that can cover many different embodiments. At VUB a digital twin serves to replicate of the structural dynamics of a real world asset.
  - To do so we couple the OWI-metadatabase to our in-house FE code or external tools such as Ashes or openFAST.
  - In this talk we will demonstrate some of the use-cases for this digital twin. Ranging from an updated estimate of the structural dynamics with today's best practices. The possibilities of virtual sensing and sensitivity studies.

- **11h00 – Different angles to Data driven lifetime assessment (VUB)**
  - This talk will summarize OWI-lab's developments in data-driven lifetime assessments. How is monitoring data employed to estimate a fatigue lifetime of an operational asset?
  - How to deal with different types of data being available? How can we assess the importance of various variables that may occur over the operational lifetime of the asset.
  - What potential role does machine learning offer?

- **11h30 – Rethinking fatigue resistance (UGent)**
  - Traditional fatigue design methods leave much to be desired. We'll dive into the main drawbacks of nominal stress-based fatigue design and explore the often-overlooked limitations of even advanced standardized methodologies. Prepare to discover how 3D scanning is revolutionizing fatigue life reassessment by allowing us to work with as-built structures, and how this will fundamentally transform the future of fatigue design.

- **12h00 – 13h00 Networking lunch**