

# Seminário em Engenharia Matemática

**Data: 12 de Setembro de 2024**

**Hora: 14h00**

**Sala: H211**

## Optimizing the Layout of Airborne Wind Energy Farms

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### **Abstract:**

Airborne wind energy systems (AWES) are a cutting-edge innovation in wind energy technology, using tethered airborne devices at higher altitudes to capture stronger and more consistent winds. Similar to conventional wind technology, multiple AWES units can be grouped to form an AWE farm, which introduces new research topics in the field. This talk will focus on optimizing the layout of AWE farms for maximizing both power production and cost-effectiveness.

The discussion begins with an overview of AWES and their advantages over traditional wind turbines. Furthermore, key challenges in designing AWE farms are also addressed, such as optimizing the number of units, their placement, and flight envelope parameters to avoid collisions and enhance energy harvest. An improved optimization method is proposed, combining the Non-Dominated Sorting Genetic Algorithm-II (NSGA-II) with the Biased Random Key Genetic Algorithm (BRKGA).

The talk also highlights the application of this method to real-world wind data, stressing the main advantages of using this new strategy for AWE farm layout optimization. This seminar is part of the closeout meeting for the KEFCODE project (Design and Optimization Algorithms for Kite Wind Energy Farms), showcasing its key results.

### **Short biography:**

**Rui Carvalho da Costa** holds a Master's degree in Electrical and Computer Engineering and is currently pursuing a PhD. His research focuses on optimizing airborne wind energy systems, particularly in the context of wind farms. He is passionate about renewable energy technologies and their potential to create a sustainable future.