

Advanced Tools for Efficient Analysis of Cable-Supported Bridges

Developing faster and more accurate methods for realistic bridge design

Project overview

This project focuses on creating new computer tools to better analyze how cable-supported bridges behave under various loads over time. The tools aim to speed up complex calculations while still providing accurate results. Currently, these advanced methods work well for simpler two-dimensional problems, but our goal is to expand their use to three-dimensional models. We will also include important effects like the impact of initial cable tension (prestressing), complex damping behaviors, and how the ground interacts with the bridge foundations.

Why focus on cable-supported bridges?

Cable-supported bridges are technically challenging structures with many complex behaviors. Studying them helps develop robust analysis tools that can handle the nonlinear and complicated nature of these bridges—and, by extension, many other types of structures.

Partners and Location

This research is a collaboration between the Technical University of Denmark (DTU) and the engineering firm COWI. DTU brings expertise in structural engineering theory and computations, while COWI contributes practical experience with real-world bridge projects and advanced simulation tools. The project takes place in Denmark and is planned for February 2026.

Method and Approach

We will develop and test new methods that simplify and accelerate the analysis of cable-supported bridges without losing accuracy. This involves advanced mathematics, programming, computer simulations, and validation against existing programs.

Expected Benefits

A successful completion of this project will provide reliable, fast, and user-friendly tools for designing complex cable-supported bridges. This can lead to better bridge safety, optimized use of materials, and lower construction and maintenance costs. The methods developed may also be adapted to other types of structures facing similar challenges.