

Title of the Course: **Suspension Bridges: Modeling, Steady States and Buckling**

Instructor: Prof.ssa Elena Vuk

Period: 9 hours, October 2023

Topics

- Introduction to mathematical modeling of suspension bridges. The extensibility concept of Woinowsky-Krieger. Analysis of the critical buckling loads.
- The Lazer-McKenna model and its generalizations to extensible suspension bridges.
- Steady states analysis and nonlinear buckling for suspension bridges with intermediate supports, for cabled-suspended beam systems and for elastically coupled double-beam systems.

References

- [1] I. Bochicchio, C. Giorgi, E. Vuk, *Buckling and nonlinear dynamics of elastically-coupled double-beam systems*, International Journal Non-Linear Mechanics, **85** (2016), 161–173.
- [2] I. Bochicchio, C. Giorgi, E. Vuk, *Long-term dynamics of the coupled suspension bridge system*, Math. Models Methods Appl. Sci., **22** (2012), 1250021 (22 pages).
- [3] C. Giorgi, E. Vuk, *Steady-state solutions for a suspension bridge with intermediate supports*, Boundary Value Problems, 2013, 2013:204.
- [4] A.C. Lazer, P.J. McKenna, *Large-amplitude periodic oscillations in suspension bridges: some new connections with nonlinear analysis*, SIAM Rev. **32** (2008), 357–378.
- [5] S. Woinowsky-Krieger, *The effect of an axial force on the vibration of hinged bars*, J. Appl. Mech. **17** (1950), 35–36.