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# BRIDGE AEROELASTICITY

**Sensitivity Analysis and Optimal Design**

J.A. Jurado, S. Hernández, F. Nieto & A. Mosquera

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# BRIDGE AEROELASTICITY

## Sensitivity Analysis and Optimal Design

### Description:

Long-span suspension and cable-stayed bridges are currently of great interest, a fact reflected in an ever-increasing number of bridges being built over bays, straits and estuaries. To address the need for more information on this type of structure, the authors have produced this book describing the current capability of analysis and design of such structures.

The book brings together cogently information that until now could only be found partially in technical magazines, including the historical evolution and recent installations of long-span suspension and cable-stayed bridges. It discusses wind-induced phenomena as one of the main perils such structures have to withstand, specifically the instability known as flutter, and describes in a very comprehensive manner the most advanced methods to evaluate bridge safety under wind flow. Finally, it is the first book to present methodology for analyzing the flutter speed of bridges both during and after construction. The authors' use of numerical optimization methodologies for improving bridge design had never been considered before for this class of structure.

The book will be of interest to bridge design engineers and researchers, in academia, in engineering design and construction firms, and in government transportation departments.



### Contents:

- Chapter 1: Aeroelastic analysis and design optimization of cable-supported bridges
- Chapter 2: Cable-supported bridges since 1940: The Tacoma effect
- Chapter 3: Methodologies of flutter analysis for cable-supported bridges
- Chapter 4: Flutter analysis of suspension bridges during construction
- Chapter 5: Flutter analysis of completed cable-supported bridges
- Chapter 6: Sensitivity analysis of eigenvalue problems
- Chapter 7: Analytical sensitivity analysis of free vibration problems
- Chapter 8: Sensitivity analysis of flutter response for cable-supported bridges
- Chapter 9: Sensitivity of flutter response for suspension bridges under construction
- Chapter 10: Flutter response sensitivity of completed cable-supported bridges
- Chapter 11: A formulation of optimization in bridge aeroelasticity
- Chapter 12: Optimization of suspension bridges with aeroelastic and kinematic constraints



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