

The role of wind loading in structural design: framework, phenomena, tools and codes

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Abstract

The wind is the most destructive natural phenomenon. Its actions are thus crucial for the safety and cost of construction and their evaluation is a cornerstone of civil engineering and a societal need for safety and economy. Wind Engineering is a scientific discipline that is best defined as “the rational treatment of interactions between wind in the atmospheric boundary layer and man and his works on the surface of Earth”. The International Association for Wind Engineering promotes international co-operation among scientists, engineers and other professionals for the advancement of knowledge in the broad field of Wind Engineering. The study of wind actions and effects on structures is a main topic of Wind Engineering and even more the subject around which Wind Engineering was built and evolved.

This presentation provides a general framework of the main problems to which structures are exposed due to wind actions and the most appropriate analytical, experimental and numerical tools to evaluate and mitigate their consequences in order to make structures safe, serviceable, sustainable, and cost-efficient. It furnishes a broad band of examples related to problems, damage and collapses of real structures exposed to wind. It discusses the shortcomings and even the risks of applying not appropriate codes and standards, and in the meanwhile the advantages involved by more accurate evaluations. It offers a synthetic overview of the still open and most relevant topics on which research is in progress.

Biography

Giovanni Solari is Professor of Structural and Wind Engineering at the University of Genoa, where he is also Director of the Wind Tunnel Laboratory. He is Senior Research Adviser at the Beijing Jiaotong University (China), Adjunct Professor at the University of Western Ontario (Canada), Guest Professor at the Universidad de la Republica (Uruguay), Honorary Professor at the Shijiazhuang Tiedao University (China). He was awarded with the Raymond Reese Research Prize, the Otto Flachsbart Medal, the Alan Davenport Medal and the Jack Cermak Medal.

He was President of the International Association for Wind Engineering, of the Italian Association for Wind Engineering, and Founding Co-Editor of Wind & Structures.

He is Fellow of the Engineering Mechanics Institute of the American Society of Civil Engineers, member of the Liguria Academy of Science and Letters, editorial board member of many International Journals. His scientific activity in wind engineering led to the publication of 3 books and over 300 papers, over 100 of which in refereed journals.

He analysed several structures and infrastructures of relevant importance, including the Tower of Pisa and the Brancusi Endless Column. He was co-responsible of the Liguria Meteo-Hydrological Centre, member of the Scientific Committee of the Messina Strait Bridge, scientific responsible of the European Projects “Wind and Ports” and “Wind, Ports and Sea”.