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Contribution to the Studies of the Wind Action in Aerodynamic (Wind) Tunnels

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Summary

The Ph.D. thesis is structured in seven chapters developed on 210 pages. In the essay there are 148 figures, 44 tables and the references contain 174 tiles.
This abstract presents the thesis retaining the main structure.

Chapter 1 – entitled "The importance of the researches regarding the wind actins on the buildings and their surrounding environment" after a short introduction regarding the type of negative actions generated by the wind (dynamic pressures on the buildings, negative actions at he pedestrian level, heat loss acceleration, accelerates the emission of the air pollution, snow/sand drift on roads or roofs, etc.) presents some casualty events generated by the wind actions and the financial evaluation of the wind endamagement in Europe in the last ten years.

Chapter 2 – entitled "The engineering (mathematical and physical) model used for the studies of the wind flow" develop the mathematical models of the atmospherically boundary layer (near the ground) - based on power low and

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logarithmical low of the vertical profile of the main wind speed and the spectral analyse and models of the turbulent aspect of the air flow.

Chapter 3 – "The building - wind flow interaction" presents the static and dynamical aspect of the wind action of the building (normal pressures on the building envelope, along wind torsion and buffeting, across wind Karman vortex, ant transversal buffeting, flattering and galloping.

Chapter 4 – "The physical model of the wind engineering*"* presents the main aspects of the physical (scale) models used in the Building Aerodynamics Laboratory from the Department of Civil and Industrial Building Engineering of the Faculty of Civil Engineering equipped with a Boundary Layer Wind Tunnel (BLWT) which has a working section 1.40 m wide x 1.40 m high x and 10 m long, with a maximum empty-tunnel wind velocity of 20 ms-1.

Chapter 5 – "Researches regarding the pedestrian level wind actions*"* develop simple approach (using an original methodology developed by the author) to provide information about wind environment conditions for preliminary building design and city planning or for the improvement of windy conditions in already existing built areas.

Chapter 6 – "A complex model for a study of case regarding wind-loads on a cable supported roof of hyperbolic paraboloid shape" develop on a physical scale model placed in the boundary layer wind tunnel combined with a mathematical model using the finite element method.

Chapter 7 – "Final considerations and new research directions" describe the main characteristics on the original methodology proposed for the study of the pedestrian level wind action and the possibility to include this in am expert system; and also for the wind action on an atypical flexible buildings the model of researches proposed by the author that develop a statistical evaluation of the peck wind actions, the influence of the site details and the combination between the physical scale model and the mathematical model.

Keywords: wind actions / load, boundary layer wind tunnel tests, pedestrian level wind nuisance, expert system, cable supported structure, pressure tapping, wind loads coefficients, roof permeability

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