

Aerodynamic Behavior And Stability Of The Tall And Slender Brasilia Telecom Tower

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The Brasilia Telecom Tower 192 meters tall designed in 1958 was constructed almost ten years later as part of the infrastructure of the new capital of Brazil, a city founded in 1960 distinguished till today by its modern urban and building architecture. Along its more than 50 years in service a large number of accessories and antennas have been attached to the upper third of its height altering the lumped mass distribution and the wind loading on the tower structure. To evaluate the effect of such alterations a comprehensive study of its aerodynamic behavior and structural stability was performed. This was accomplished by means of both theoretical models and short term dynamic monitoring. A complete 3D computational model of the tall and slender trussed steel tower structure was constructed and validated through correlations between theoretical and experimental results for frequencies and displacement amplitude of aerodynamic responses of the structure. This model was used to obtain time-domain responses of the structure under the action of turbulent wind loading for various wind directions. It was found that the existing large number of antennas and their steel frame supports attached to the tower caused a considerable increase in the aerodynamic forces, particularly in the upper third of the tower structure. Based on these results two alternatives were considered: structural reinforcement of deficient elements or the installation of dynamic control devices.