fan being situated at one end of the pipe to simulate a variety of wind conditions. The wind tunnel bears the name "boundary layer" since Dr. Davenport is concerned mainly with conditions in the first 1,500 feet (450 m) above the ground, a region in which wind effects on buildings occur.

Aeroelastic models of the building under study are constructed at a scale of about one-fourhundredth of the actual size and measurements are made of deflections in the model under a variety of simulated wind conditions. Using modelling techniques, a stress or deflection of the model is related to an effect in a real building under related atmospheric conditions.

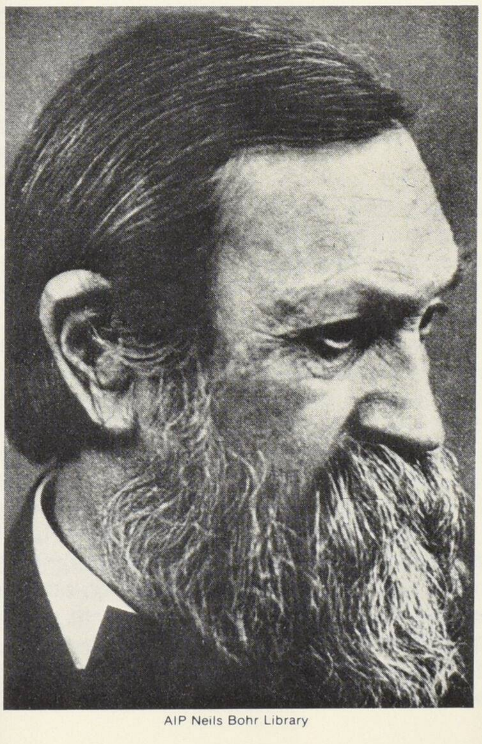
As computers continue to make inroads into scientific research, it is natural to ask: Could not these predictions be made theoretically? Dr. Davenport replies: "While it is possible to make a computer model of a bridge or a tower, it is rather difficult to make a complete mathematical model of wind; it is too complicated and unpredictable. When I began my research, engineers who were interested in predicting the effects of winds made their estimations using a steadily blowing wind. This could be called the "static theory of wind" for it assumes that a building experiences an unvarying wind pressure. However, even in the steadiest wind, surrounding buildings introduce turbulence and other random effects. It is these effects which can accumulate and cause wind-induced vibrations of a building, possibly resulting in a structural failure. Turbulence is difficult to simulate by computer in a reasonable length of time and at a reasonable cost. Instead, we place a model of the structure, together with models of the surrounding buildings, in a wind tunnel and insert electronic sensors into the model. The computer comes in when we analyze the mass of data which we obtain from the wind tunnel simulation."

During the design of the CN Tower in Toronto, novel building materials were used and it was important to quantify their behavior in the final construction. Concrete of very high quality was employed in the building and the model study enabled the stiffness of the tower to be related to various parameters in the concrete mix. Such a study can result in substantial savings. For example, model studies may suggest that less concrete or lighter steel can safely be used in a structure. The savings in such a case would more than pay for the study and, more important, new codes for similar buildings throughout the world would be established. The case of the CN Tower is of particular interest to Dr. Davenport because he was able to follow up the wind tunnel predictions by making a comprehensive study of the Tower during its construction. At the present time, his colleagues are making precise measurements of the completed Tower's movements under actual wind conditions.

It is not only a completed building which is of concern to the construction engineer but the actual process of construction, which accounts for Dr. Davenport's frequent consultation by industry during the planning stage of a tower, bridge or radio telescope. In the case of a suspension bridge, for example, its most critical period occurs not under heavy traffic but during construction. Dr. Davenport was contacted during the early stages of the planning of the Murray McKay suspension bridge at Halifax. This bridge had several structural innovations, resulting in the weight per square foot (per m^2) of roadway being half that of a conventional bridge. In addition, a new construction technique was attempted by connecting whole sections together rather than assembling smaller pieces. Tests by Dr. Davenport and his associates demonstrated that such a construction would be safe; the bridge has been completed in record time — the suspended bridge deck being completed in under two months compared with a period of as much as one year in the case of other techniques.

By maintaining close liaison between the building industry and the laboratory, Dr. Davenport is able to achieve two goals: an increase in the understanding of the physics of wind and its movements around objects, and immediate contributions to building codes and individual building problems. This Canadian watcher of the wind has sown seeds the fruits of which will be reaped for years to come, not only in economic advantages but in the general improvement of the quality of life in our cities. ☐

David Peat



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Ernst Mach (1838-1916), Austrian physicist and philosopher whose writings exercized a considerable influence on Albert Einstein during the formative years of Relativity Theory and upon the Vienna school of philosophers which developed Logical Positivism. Amongst his many interests, Mach made a study of air flows across various objects; the "Mach number" is used to relate model studies in a wind tunnel to actual flow over a completed structure.

Ernst Mach (1838-1916), physicien et philosophe autrichien dont les écrits ont exercé une influence considérable sur Albert Einstein pendant les années de gestation de la théorie de la relativité et sur l'école de Vienne des philosophes qui ont développé le Positivisme logique. Parmi les nombreux domaines qui intéressaient Mach on peut citer une étude des écoulements gazeux autour de différents objets; le "nombre de Mach" est utilisé pour établir une relation entre les études sur maquettes en soufflerie et l'écoulement réel autour des structures grandeur réelle.