Coefficient of Wind Force and Its Estimation Using the Small Plane Model Assuming a Difference in Tree Form

by

Kohji FUKUDA, Motohiro SUGIYAMA, Ryosuke OHKAWA and Katsumi HIRAOKA

(Received on Mar. 31, 2004, accepted on June 16, 2004)

Abstract

A series of wind tunnel tests has been performed on the small plane model assuming a difference in tree form. The small plane model is manufactured with a tree crown part using plywood and plastic board (the form of each of five boards, whose area ranges from 144.5cm^2 to 450cm^2, differs) and a trunk part using vinyl chloride rod. Testing was conducted by making a steady wind act gradually from a wind velocity of 4m to 22m, and the rate of acceleration, which disturbed the flow of air artificially at each wind velocity, was measured. The wind force coefficient, C_D, of each small plane model was calculated from the experiment result, and the relationships between C_D and wind velocity, C_D and the aspect ratio of the plane model, and C_D and a dominant frequency were investigated. It was shown that the coefficient of wind force can be presumed from the area and the aspect ratio of the plane model by formulizing and arranging these relationships.

Keywords: Wind tunnel tests, Coefficient of wind force, Small plane model, Re-vegetation, Tree

*1 Graduate Student, Course of Civil Engineering.
*2 Associate Professor, Department of Civil Engineering.
*3 Professor, Department of Aeronautics and Astronautics.