

MEASURING THE DRAG FORCE OF VEGETATION

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Abstract

The objective of this study is to determine the relationship between total drag force and velocity for two species of vegetation with and without foliage. Experiments were conducted in a laboratory flume using vegetation species that differed in their biomechanical properties: branches of pine (*Pinus Sylvestrus*) and ivy stipes (*Glechoma Hederacea*). The drag force was measured using a strain gauge technique and determined for a series of water flow velocities for each vegetation species with and without foliage. Rigid cylinders of uniform diameter and of similar diameter to the vegetation samples were also tested in the same experimental set-up. For a given velocity the addition of foliage to a plant form increases the drag exerted by the plant by a factor of between 2 – 6 for the pine branches and 2 – 4 for the ivy stipes. For the pine branches the relative increase in drag force between a ‘with’ foliage plant and its non-foliage counterpart decreased with increasing velocity. This is likely due to the streamlining of the needles at higher velocities. The flexibility of the vegetation and the ability to streamline with the flow changes the projected area and thus the flow resistance.

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