Experimental observations of flow field around macro-scale roughness

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ABSTRACT

The turbulent flow in the case of macro-roughness elements is strongly affected by the vortex structures which develop around the macro-elements and force the flow to deviate from the undisturbed uniform flow, for which the logarithmic law of the wall is assumed to be valid. In this case macro-roughness element planimetric arrangement plays a fundamental role in energy dissipation behavior. Indeed it seems that an optimal macro-roughness element spacing value exists, able to maximize flow resistance. This special behavior may be related to the transition from an isolated-roughness to a wake-interference flow.

This paper presents the preliminary results of a laboratory study on the flow around macro-roughness elements according to different special arrangement in order to evaluate the wake interference: i) single test block and ii) one row of test blocks with five different values of the distance between two elements.

The velocity profiles are measured in order to reconstruct the flow field around the test block to the purpose of estimating the spatial evolution of a steady wake. The preliminary analysis of the results is here presented.

Keywords: Flow resistance, wake interaction, turbulence.