عنوان مقاله:

Empirical Investigation of Flow Interferences and Aerodynamic Behaviors of Three Squared-section Cylinders in a Linear Arrangement Subjected to Cross-Flow and Various Incidence Angles

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خلاصه مقاله:

This research is an attempt to investigate wind tunnel tests to measure the minimum values of force coefficients in three cylinders of identical squared–section in a linear arrangement when subjected to a cross-flow. These tests were conducted at subcritical Reynolds number of 60.7×3.4. The pressure is measured by an electronic pressure transducer on each cylinder surface. The transducer is installed in six different angles of incidence varying from . to 3.o, while a spacing ratio of 6 times the square side is used. Some applications of multi-cylindrical structures include sky scrapers, chimneys, cooling systems for nuclear reactors, coastal structures, heat exchanger pipes etc., where the only way to model the flow through the structure is to apply multi-cylinder arrays subjected to a cross-flow. Studies on triple cylinder systems may contribute to recognition of more complex flows within arrays with more extended cylinders. For the current arrangement, when the cylinders are in such a way that α=.o, it is observed that contributions of flow interference among the cylinders are attenuated and pressure coefficient distribution over upstream cylinder is almost similar to that of a single cylinder which is in a good agreement with the reported results by Otsuki et al. measured for a single cylinder at Re=6×3.4. Generally speaking, in a linear arrangement, the lift coefficient in the upstream cylinder is higher than those in the middle and downstream cylinders. Furthermore, increasing the value of α is associated with an increase in the lift coefficient for all cylinders. Variations of α strongly affect flow patterns around the cylinders as well as aerodynamic coefficients. In addition, the effect of flow interferences among the cylinders is fairly increased when α increases

کلمات کلیدی:

multi-cylinder arrays, linear arrangement, aerodynamic flow, pressure distribution, incidence angle