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The determination of form drag coefficient for rigid, emergent objects in open channel flow

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ABSTRACT

The development of methods which are better able to predict the effect of large scale emergent roughness elements on the flow characteristics requires a better understanding of the drag coefficient under conditions likely to occur in the field. A laboratory investigation was carried out with newly developed equipment to quantify the drag force on various shaped cylinders, as well as the drag on an individual cylinder surrounded by an array of cylinders. The relationship between the drag coefficient and cylinder Reynolds number for a single circular cylinder was found to be of similar form but larger in magnitude than the established relationship for an infinitely long cylinder; the relationship departs from the infinite cylinder relationship for low cylinder Reynolds numbers. Contrary to previous research, the results for the multiple cylinder investigation did not reveal a clear relationship between the cylinder density and drag coefficient. Equations were developed and verified with existing laboratory data. These should be improved and extended by further research for field use.