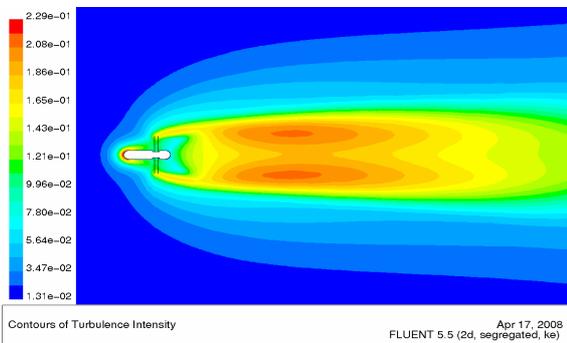


Investigation into the effects of Arrays and Ducting on a Marine Current Turbine

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Introduction

As part of the SuperGen Marine group, this project will examine the flow characteristics of a marine current turbine and investigate the effects of applying various configurations of ducting to improve the performance of the system. It will also investigate the optimum general layout of an array of marine current turbines, in order to achieve a high yield of power generation.



Ducting

Due to the large increase in drag forces, turbines in free stream velocities are rarely fitted with substantial ducting. However, given a stable and strong mooring system, this is not a problem for a Marine Current Turbine. Ducting can provide a smoother transition between velocity discontinuities, whilst increasing the fluid speed through the turbine, thus increasing power generation.



Current Work

Within the departmental research group, two other doctorates are being undertaken; the information gathered in these being complimentary to this project. The first looks at designing a mooring device suited to the departments own Contra Rotating Marine Current Turbine (Stephanie Ordonez), and the second takes a detailed examination of the wake produced by the same Turbine through CFD (Tom McCombes).

Arrays

In order to achieve the highest possible yield in a given area, the optimum method of positioning multiple devices must be found. This will take into account the wake characteristics, such as the complex vortices shed from the blades, as well as the minimal spacing allowance as dictated by any mooring device. This will be analysed for both general environmental conditions and specific geographical locations.

Method

Work on these topics will be done primarily by creating numerical models of the marine current turbine using Computational Fluid Dynamics programs. Relevant experimental work will also be carried out in order to verify the results and conclusions.

