

Project Title: 'Accelerating of tidal stream turbulence research in the North West.'
Principle Investigator: Dr T Stallard (University of Manchester)
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In order for the UK to meet its ambitious targets for energy production from renewable sources (10% of electricity by 2010, 15% by 2020) it needs to expand its capacity to generate all forms of renewable energy and marine energy is a big part of this. The development and production of new solutions for generating renewable energy, as well as contributing to meeting the UK's energy targets, provides business opportunities internationally. This project is concerned with marine energy in the form tidal streams which may in principle supply a significant amount of the UK's energy consumption.

A significant proportion of the UK's tidal resource is associated with flows which could be said to be turbulent, turbulent water can be described as being chaotic and random in its behaviour. These flows are usually also high speed and therefore potentially the most productive for tidal stream devices however previous experiments have shown that turbulent flows can also cause damage to tidal energy devices. This project is to carry out research into tidal flows, then create a computer model to simulate the turbulent flows that can be expected at a particular site and the impact they would have on tidal stream devices. To do this a comprehensive study of existing literature and on-going work on tidal stream turbulence and of turbulence models used in industry was carried out by the researcher on the project. Experiments have already been conducted and data collected on a variety of different tidal stream devices in the University of Manchester flume facility, this is a Joule funded device which simulates waves and currents, and this data was used to compare to the models of turbulent flows created.



From this project two areas of research have been identified as requiring further investigation:

- numerical methods which simulate the interaction between turbulent flows and rotating blades in tidal stream devices
- simulation of the characteristics of the large visible tracks of turbulence tidal energy devices create (wakes)

The project managed to demonstrate that tidal flows could be efficiently simulated using commercial software on a PC and the method used was shown to improve upon existing methods of simulating their effects on tidal stream devices. An overview of the method and preliminary findings were presented at the 18th International Offshore and Polar Engineering Conference (ISOPE).