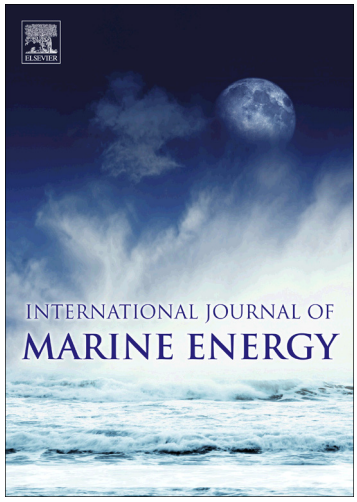


# The influence of blade roughness on the performance of a vertical axis tidal turbine

Luis Priegue, Thorsten Stoesser

PII: S2214-1669(17)30007-3
DOI: http://dx.doi.org/10.1016/j.ijome.2017.01.009
Reference: IJOME 140

To appear in:

Received Date: 12 January 2016
Revised Date: 10 October 2016
Accepted Date: 11 January 2017

Please cite this article as: L. Priegue, T. Stoesser, The influence of blade roughness on the performance of a vertical axis tidal turbine, (2017), doi: http://dx.doi.org/10.1016/j.ijome.2017.01.009

# The influence of blade roughness on the performance of a vertical axis tidal turbine

Luis Priegue[a], Thorsten Stoesser[a]

[a] *Cardiff School Of Engineering, Trevithick Building, 14-17 The Parade, Cardiff*

**Abstract**

This paper reports the findings of an experimental study investigating the influence of blade roughness on the performance of a vertical axis tidal turbine. Due to their design, vertical axis turbines undergo periods of stall, i.e. flow separation from the blade, during each revolution. It is hypothesised that roughening turbine blades delays flow separation (in analogy to flows over rough bluff bodies) and hence diminishes turbine stall which in turn should result in an increase in turbine performance. Laboratory experiments were undertaken in Cardiff University's hydraulics laboratory, testing vertical axis turbines with rotors comprising smooth and rough blades. Three different blade surface roughnesses were tested, with the results showing a significant reduction in performance when the turbine is operating at high chord Reynolds numbers. In addition, the combined effect of blade roughness and rotor solidity as well as blade roughness and number-of-blades on the performance of vertical axis turbines are analysed. It is shown that solidity and number-of-blades appear to be similarly influential than blade roughness.

*Keywords:* `Blade roughness; vertical axis tidal turbine; cross-flow turbine; physical experiments`

## 1. Introduction

With fossil fuel resources slowly dwindling there remains the pressing need of exploiting other resources of energy. The fact that tidal stream energy is renewable and predictable makes it a promising alternative resource. Tidal stream