

Patented Wave power Generator: Preliminary Physical Model Tests

Background

In early January 2007, a private entity approached the CSIR to investigate a patented wave power generator (WPG) to be used for extracting electrical energy from ocean waves. A 1:50 scale model of the device was manufactured and patented by the private entity. The CSIR's Built Environment Division agreed to conduct preliminary tests of the model WPG as part of our Research and Development Initiatives.



Approach

The objective was to gather relevant information for a preliminary assessment of the capability of the wave power generator (WPG) to produce electricity from the energy available from waves in the open ocean.

The goal of the tests was to:

- provide the patentee with some general background knowledge of wave theory which may be useful to him,
- evaluate the wave height degradation along the length of the WPG,

- evaluate the amount of rotational movement a certain wave height and period imparts upon the floating torque arms, which could then give an indication of the amount of power the WPG could extract from a wave field,
- identify some possible locations in South African waters for the WPG.

Physical model study

2D physical model studies were conducted in a flume at the CSIR's physical modeling facility in Stellenbosch.

A 1:50 scale model was tested in this flume under a series of simulated wave conditions. Measurements of the waves were compared with the measured movements of the torque arms, which are the parts responsible for converting the wave motion into mechanical motion.



An electronic distance measuring device was mounted to the WPG and measured the rise and fall of the torque arms, (responsible for converting the wave motion to

mechanical motion), a digital camera was used to record these measurements, which were later documented and analyzed.

Wave height degradation along the length of the device was also measured for an estimate of the WPG's extraction efficiency.



Conclusions

The physical model study showed:

- Increases in the amount of torque arm rotation with increasing wave height and increasing wave period.
- An increase in wave power with increase in wave height, but smaller wave periods result in more wave power, due to the increase in the number of waves in same time interval.

The results will be used for a presentation to the South African Department of Mineral Affairs and Energy in order to obtain funding for product development and possible commercialization of the privately patented device.

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