

Environmental modeling of Ocean Thermal Energy systems

Introduction

Covering seventy percent of our globe, the oceans are world's largest solar collectors. The larger part of this solar energy is captured as heat in the upper layers of the oceans. From the natural temperature difference that exists between the upper and deep layers of the ocean, energy can be extracted. This is so-called 'ocean thermal energy' and is in particular of interest in the tropics where it can be instrumental in helping islands and coastal regions in achieving a sustainable future.

Project

Ocean thermal energy is considered potentially among the most environmentally benign methods of generating electricity or providing cooling for buildings. The primary concern with ocean thermal energy utilization is the potential impact on the marine ecosystem, amongst others, by redistribution of large water masses in the ocean and impingement and entrainment of marine life. Vice versa, environmental phenomena such as internal waves, ocean turbulence, and mixing can have an effect on the system performance.

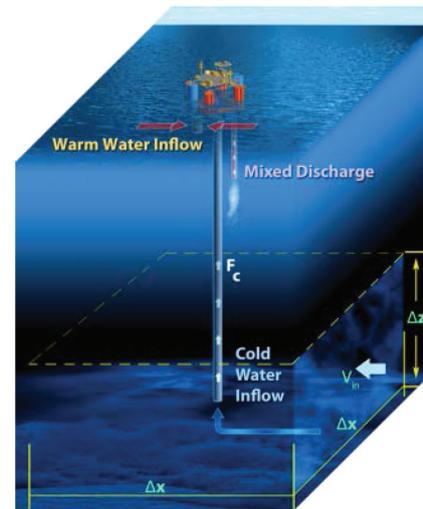


Figure - intake and discharge flows of a floating Ocean Thermal Energy Conversion power plant:

Thesis objective and suggested activities

The aim of this MSc thesis project is to analyze the environmental effects of ocean thermal energy utilization around the island of Curaçao. Suggested research activities are:

- Evaluation of the year-round ocean characteristics around Curaçao considering profiles of currents, density, temperature, salinity, and nutrients distribution;
- Numerical modeling of the system seawater intake and discharge flows, ocean turbulence and/or internal waves affecting ocean thermal energy system performance;
- Quantitative assessment of different locations, intake and discharge depths, and/or spacing between power plants.

In collaboration with the student, more focus will be defined.

Practical relevance

You will contribute to a relative new field of research and provide initial insights in the environmentally safe implementation of Ocean Thermal Energy systems. This research project has all ingredients to be published in a paper and to be presented at scientific conferences.

Supervisors

- Prof. dr. J.D. Pietrzak, Delft University of Technology
- Dr. A.S. Candy, Delft University of Technology
- Ir. B.J. Kleute, Bluerise: company, located in Delft, developing Ocean Thermal Energy systems

Contact

Prof. dr. J.D. Pietrzak
J.D.Pietrzak@tudelft.nl

Dr. A.S. Candy
A.S.Candy@tudelft.nl

Bluerise BV
B.J.Kleute@bluerise.nl