REVIEW ON FLOAT BASED OCEAN WAVE ENERGY GENERATOR

Prof. Sagar Bhaisare, Rutvik Shende, Samiksha Jamjar, Shraddha Vaitage

Department of Electrical Engineering, KDK College of Engineering, Nagpur, INDIA

Abstract: Our project deals with the concept on conversion of the movement of a float placed on surface of ocean to run a generator. Similarly, the second generator run with the movement of Turbine placed at the bottom inside water. The energy from ocean wave chacterize by high force and low speed energy, which has to be converted to a high speed and low force energy Generator driven by mechanical conversion system. The buoyancy force on the float from the raising wave and the gravitational force on the float when the wave is sinking are enormous. This enormous force contains high amount of concentrated energy which can be trapped and utilized to run our generator. The system is similar to that the idea of piston in a stationary coil which is moving in the same way as the float, as well as the turbines mounted at the bottom will be moved by the movement of ocean waves and is to be connected to next generator. The two movements (i.e one of the float which will move up and down and run a generator and another is rotational movement of turbines will run another generator). A Voltage Doubler is used to Double the generated voltage, and a LED Display to show the amount of Energy Generated.

INTRODUCTION

Ocean wave energy is one of the renewable sources to produce electricity and the wave energy can be converted to electricity by using different methods like power absorber, oscillating water column, attenuator and overtopping. The main challenge in most of the methods is to implement the principle mechanism that converts movement of wave to movement that suits the requirements of electrical generator. In Point absorber concept, the wave power plant is basically a float at stationary position which is moved up and down as the wave passes. Multiple floats of small size mounted on the top and two different types of generator will be utilized to convert the up & down motion of the float. Convert high torque and low frequency to low torque and high frequency or rpm for linear and rotational generator respectively. The estimate and idea of the complete system size and dimension can be compared to a cylinder size of 3 feet in height and 6 inch diameter. The proposed size is suitable to use our designed wave energy generator to operate near sea shores where the water column height is approx. 3 feet or we can say shallow depth.

METHODOLOGY

Tidal Stream Generator: In this method the kinetic energy in the waves is directly converted into mechanical power in turbine and then into electrical energy from generators coupled to the turbine. The turbine generators can be made part of existing bridge structures or can be arranged at ocean straits and inlets. The turbines may be vertical, horizontal, or open. They are placed at the bottom of the water to realize maximum benefit.

Tidal stream generators connected with underwater turbines. As opposed to using the rising and falling movement of the tides, tidal stream generators take advantage of the fast moving sea currents (tidal streams), which flow when tides are moving in and out. These tidal streams cause the turbines to rotate, turning the generators to generate electricity. A horizontal axis turbine comprises a propeller with blade is used. The turbine is mounted on a tower fixed to the seafloor, which is more suitable for shallow waters, or can be deployed below a floating support, for deep waters.

The generated electricity is not in stable and continuous form, means some time generator generates more output, sometime low output voltage, hence a DC-DC converter is used to Buck/Boost the voltage generated by generator. Further this converted power is store in accumulator (Batteries) . In our project the output generated by a generator is first monitor by PIC micro-controller , thereafter PIC controller gives a PWM pulses to the buck-boost converter. The output after buck/boost converter is also monitor by microcontroller. If the output voltage is above/below the set reference voltage required to charge the battery, then the PIC controller vary the PWM pulses, keeps the voltage stabilized.Tidal stream generators have the advantage of being much cheaper to build. The turbines turn relatively slowly, hence do not affect sea life. This is different to tidal barrages, which can disrupt fish migrating up rivers from the sea.

CONCLUSION

Tidal wave power generation is a kind of renewable energy with large potential. It has many advantages over solar and wind energy. For example, the availability of tidal energy is highly predictable and not subject to the impact of weather condition. The energy density of tides is also higher than solar and wind energy. However, the high demand in technology and capital investment has hindered the development of tidal energy so that the tidal energy projects are much less than those of solar and wind energy. With the development of innovative tidal turbine system and coastal infrastructure, the popularization of tidal energy worldwide can be expected.

REFERENCES

- H. Ming Chen, Donald R. DelBalzo, "Heave-enhanced Linear-Sliding Wave Energy Converter", Published in [1OCEANS 2016 MTS/IEEE Monterey 1st December 2016, IEEE International Conference on Renewable Energy and future at Monterey, CA, USA 19-23 Sept. 2016.
- Ravindra Babu Ummaneni, Jon Eirik Brennvall, Robert Nilssen, "Convert Low Frequency Energy from Wave Power Plant to High Frequency Energy in Linear Electrical Generator with Gas Springs", Published in 978-1-4244-1763-6 IEEE Power India 9th January 2009 Joint International Conference on Power System Technology and IEEE Power India Conference (2018).
- Van Huu Thinh, Phan Cong Binh,"A Study on the Wave Energy Converter Using Mechanical PTO", Electronic ISBN: 978-1-5386-5126-1, DOI: 10.1109/GTSD.2018.8595546 IEEE 4th International Conference on Green Technology and Sustainable Development (GTSD) 31st December 2018, International Conference on System Science and Engineering (ICSSE)(2019).
- Dan Li, Baodong Bai, Qing Yu, Baofeng Zhu, "Research on a floating type of wave power generator", ISBN Information: Print ISBN: 978-1-4244-5045-9 Electronic ISBN: 978-1-4244-5046-6, Added to IEEE Xplore 23rd July 2016, 5th IEEE Conference on Industrial Electronics and Applications 2016.
- Hangil Joe, Hyunwoo Roh, Son-Cheol Yu, "A New Wave Energy Converter using Flap-type Blade and its Power Generation Test", Electronic ISBN: 978-1-5090-5266-0 Department of Creative IT Engineering, Pohang University of Science and Technology, Pohang, 790-784, South Korea Published in IEEE Underwater Technology (UT) 3rd April 2017.
- Sung-Won Seo, Kyung-Hun Shin, Min-Mo Koo, Keyyong Hong, Ick-Jae Yoon and Jang-Young Choi, "Experimentally Verifying the Generation Characteristics of a Double-Sided Linear Permanent Magnet Synchronous Generator for Ocean Wave Energy Conversion", Published in DOI 10.1109/TASC.2020.2990827, IEEE Transactions on Applied Superconductivity 6th May 2020.