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Development of Energy Harvesting in Water Wave

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Abstract: *Wave energy convertors have differed from design to design; this is mainly due to the fact that each model has different energy harvesting rate and successive conversion power take-off. Despite these, each design faces the same predicament. They should be optimal enough to effectively extract wave energy under different wave conditions whilst the material that– is being used to make the model should be able to withstand some of the sea problems corrosion, fatigue, biological fouling, fractures and possibly impact loading. To combat biofouling and corrosion of steel structures is to maintain them regularly and by painting them. These are very time consuming and costly. With regards to painting the model, it can prove to be detrimental to the marine environment, especially if antifouling paints are being used*

Keywords: Water Wave, Energy Harvesting, Power Generation etc

I. INTRODUCTION

Renewable energy has been established as one of the most prolific development areas in the twenty first century. The difficulties surrounding exploiting renewable energy resources are no longer related to developing novel technologies, but rather related to the transition and implementation of the renewable harvesting systems within the petrol based power grids around the world. Increase in demand for energy has stimulates socio-political pressure to explore sustainable and viable alternatives to fossil fuels. In particular, energy stored in ocean wind-generated waves is considered as an interesting alternative option to reduce the world energy dependence on fossil fuels. The world's energy demand is increasing, traditional fossil energy consumption is rapid, and the ecological environment is gradually deteriorating and seriously threatening the sustainable development of human society.

Wave energy is as source of power that comes from the endless march of the waves as they roll into the shore then back out again. Humans harness this power along the coastal regions of the India, United States, Canada, Scotland, and Australia. Energy that comes from the waves in the ocean sounds like a boundless, harmless supply. Ocean Wave Energy also known as Wave Energy is another type of ocean based renewable energy source that uses the power of the waves to generate electricity. Unlike tidal energy which uses the ebb and flow of the tides, wave energy uses the vertical movement of the surface water that produce tidal waves. Wave power converts the periodic up-and down movement of the oceans waves into electricity by placing equipment on the surface of the oceans that captures the energy produced by the wave movement and converts this mechanical energy into electrical power. The point absorbers method, oscillating water column, wave overtopping reservoir, Tidal lagoon power, Ebb & Flood generation and much other method are established but they have limited working features. Waves transport energy from where they were created by storms far out in the ocean to a shoreline. But a typical ocean wave does not resemble a perfect sinusoid; they are more irregular and complex than a simple sinusoidal wave. Only the steady up-and-down movement of a heavy swell resembles a sinusoidal wave much more than the chaotic nature of locally generated wind waves. The method extends perpendicular to the direction of the wave and capture or reflect the power of the wave. These devices are typically onshore or near shore; however, floating versions have been designed for offshore applications. The method has potential to produce power 500kw to 2mw, according to systems size and using in series or parallel system.

Most of the surface of the earth is occupied by oceans, and huge energy is stored in the oceans. Among marine energy sources, wave energy, tidal energy, tidal current energy, etc. are included. As a widely distributed, high energy density, pollution-free and environmentally friendly renewable energy source, ocean wave energy attaches great importance to ocean energy in most countries in the world. Compared with wind power and photo-electricity, the utilization of ocean energy with wider distribution and greater energy density is still lagging behind. Ocean wave energy power generation

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mainly refers to the use of corresponding technical equipment to convert the powerful kinetic energy of ocean waves into electrical energy. In view of the current tight supply of traditional energy, it can effectively relieve the problem, promote the development of marine resources and improve the environment. Therefore, this paper studies the wave power generation technology. First, the article analyzes the system principle of using wave energy to generate electricity, introduces several commonly used wave energy conversion devices, and then studies its power generation technology from the aspect of control strategy, so as to maximize the energy conversion power in the wave energy generation process. It will maximize the conversion of wave energy to electrical energy.

II. AIM OBJECTIVES OF THE PROJECT WORK

- To achieve continuous electricity power output.
- For desalination of water, also to operate machine tools etc.
- Use for remote areas where transmission and distribution not feasible (like islands).
- The system located above sea level (also at territorial to contiguous range) so, the problems discuss above will be eliminated

III. DESIGN CONSIDERATION AND DRAWING:

3.1 Design consideration:

To develop this system & to investigate performance, modeling and mathematical calculations have to develop. Different models of this system have covered in literature. Following are the components from review of literatures:-

3.1.1 Meteorological data:

Meteorological analysis of the location has to be made for optimization process. It is important for total utilization of water wave sources. Measuring water wave resources data is main input for model development. That all data should be measured hourly, daily and as per weather or climate change.

3.1.2 Load Demand:

It is necessary part of system to design & analyze. To find out the exact load demand it is very complicated and difficult to decide. Load variation for different seasons is not predictable, so system have to design for nearer or more than load demand to full fill requirements.

3.1.3 System Configuration:

By studying all data like solar radiation, wind speed and load demand proper selection of equipment have to be made. But sizing of system will be according to the environmental conditions. Because producing power from water wave is depend upon the location which is to be selected.

3.2 Design Drawing:

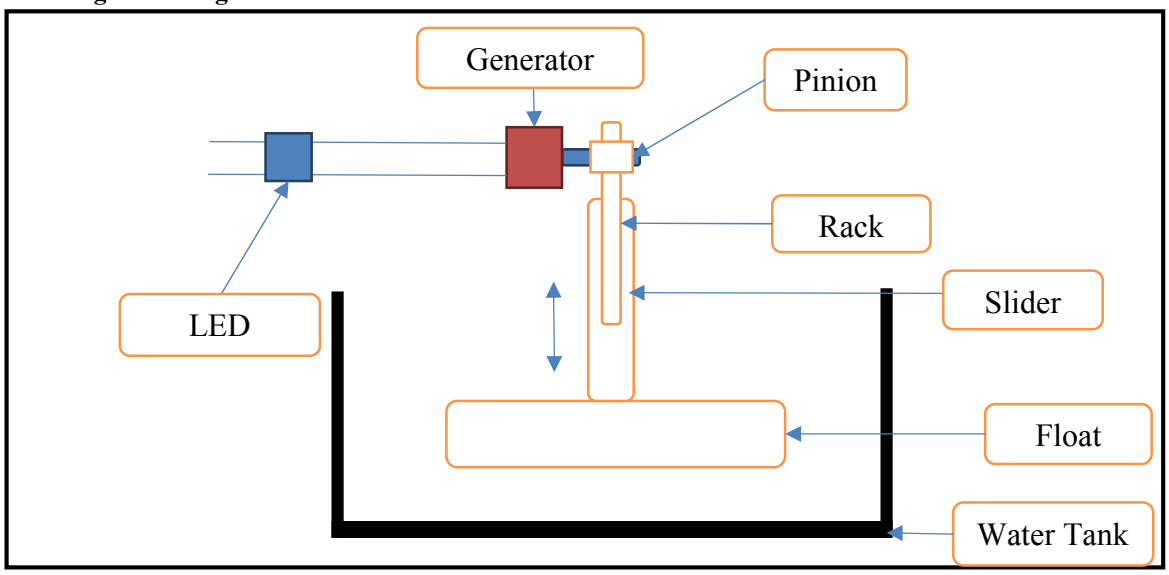

Figure: Water wave power generation

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IV. CHALLENGES

- Mostly the current technology is consisting submerged or floating type structures. So they affected to limitations (like corrosion, fouling) hence the special type of material required, Also design, operation quite complex; so they're not economic feasible.
- Affecting the marine ecosystems.
- Generally located to deep sea, so the power distribution not reliable. In some of the cases chances of international conflict.
- The limitations of working principle, the continuous power output not achieve. (Depending on Flood tide and ebb tide, Air pressure difference.)

V. FUTURE SCOPE

In future, this method can be developed more and area of establishment are using it in series of system. As per our design we observed from prototype the power generate only in upward motion of float while the downward motion cannot be utilised, so to utilize both motion of float we can solve this problem by designing the gearbox to produce continuous power with single generator. Also by placing two generators one can produce in upward motion &other one will produce energy in downward motion. This can be alternative way to fulfil the energy demand and prevention again energy crisis.

VI. CONCLUSION

The technology of using wave energy to generate electricity has a history of hundreds of years, and it has developed particularly rapidly in recent decades. From the perspective of development history, it mainly includes theoretical research, device manufacturing, internal testing, external sea trials and other stages. Compared with related research abroad, my country's research on this technology started relatively late and the technology is not mature enough. However, in recent years, more attention has been paid to the development and utilization of wave energy at the national level, making the development in this field very rapid. There are many types of wave energy conversion devices. Each device has advantages and disadvantages. First, in the target sea area, you should fully understand the wave characteristics, and then select the appropriate type according to the wave characteristics of the target sea area. In this paper, the generation power of the wave energy power generation system is studied. Under the sea conditions where the wave frequency is large, it has a higher power generation.

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