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POWER GENERATION FROM SEA TIDES

Raghuraddi S Sangalad

Department of Mechanical Engineering, R.T.E. Society's Rural Engineering college Hulkoti, Gadag, Karnataka, India-282205, Email : raghu9164114464@gmail.com

ABSTARCT

Ocean wave energy plays a significant role in meeting the growing demand of electric power. Economic, environmental, and technical advantages of wave energy set it apart from other renewable energy resources. Present study describes a newly proposed that is employed to harness heave motion of floating buoy to generate power. Focus is on the conceptual development of the device, illustrating details of component level analysis. Employed methodology has many advantages such as i) simple and easy fabrication; ii) easy to control the operations during rough weather; and iii) low failure at during normal sea conditions. Experimental investigations carried out on the scaled model show better performance and its capability to generate power at higher efficiency in regular wave fields. Design Failure Mode and Effect Analysis (FMEA) shows rare failure rates for all components except the floating buoy.

INTRODUTION

Almost 71% of the earth is covered with water in the form of oceans. Oceans have tremendous potential of providing green and sustainable energy to the world. Various forms of ocean energy are sources such as wave, tidal, marine current and thermal gradient. Ocean energy is much more predictable than solar and wind, Apart from increasing the energy generation it can also contribute to reduction in carbon footprints and generation of jobs for people. According to the world offshore Renewable Energy Report 2002– 2007 released by the U.K. Department of Trade and Industry (DTI), it has been suggested that 3000 GW of tidal energy is estimated to be available where less than 3% is located in areas suitable for power generation. This energy still remains under- utilized because of its high cost of generation and as it is considered as a threat to marine life and aquatic animals.

Future energy-supply projections suggest that there will be problems in satisfying the demand of the next century. The present total installed electric capacity hardly meets the grid demand. Uncertainty of the monsoon and environmental problems of coal burning put a strong limitation on expansion of present generation capacity.

The present contribution of power generation from nuclear plants is small, and the risk of environmental hazards of such plants indicates that development of renewable energy sources is important for India. Wave power refers to the energy of ocean surface waves and the capture of that energy to do useful work. Sea waves are very promising energy carrier among renewable power sources, since they are able to manifest an enormous amount of energy.

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The quest for clean sources of energy is far from the only challenge facing the societies and environments of the world. Poverty, disease, war, hunger, the destruction of natural habitats, eutrophication of water bodies, and the dwindling supply of fresh water are problems that sometimes feel almost forgotten today when most media and societal focus is on global warming and the emission of green house gases. Still, with this imbalance in mind, the utilized energy sources and the energy generating processes tie into many of these problems in addition to the melting of the ice caps, and modern renewable energy technologies avoid lot of the unwanted effects of traditional energy sources. The road to a future with little but non-polluting energy sources is, however, both long and difficult. Today fossil fuels makeup approximately 80% of the gross primary energy used in the world's societies, and the International Energy Agency (IEA) anticipates that the same will be true in year 2030 in addition to a projected increase in global energy consumption by 1.6% per year. The quest for clean sources of energy is therefore both important and urgent, but it is simultaneously hard pressed from competition with fossil fuels. Renewable energy technology that can start to compete with traditional energy sources at an economic level, without subsidies.

OBJECTIVES

- The objective of this project is to generate power from the sea waves or the tides
- To tap waste fuel energy and convert it into electrical energy
- To minimize the energy problem since it is generated in a small way at various places and can be utilized for various purposes.

METHODOLOGY

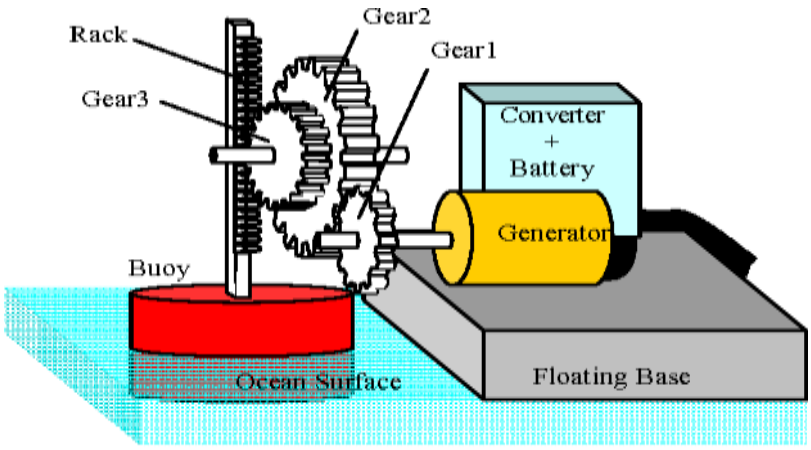

Fig. 2 Direct-link wave power generating system

Fig. shows the overall assembly of proposed Mechanical Wave Energy Converter. It consists of a floating buoy with rack and pinion arrangement employed for converting reciprocating (vertical) motion into oscillatory (rotary) motion. While the floating buoy is

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connected to gear rack through the shaft, two vertical shafts are assembled with the gear rack and encircled by guide posts to protect the floating buoy from encountered ocean waves. Driving sprockets mounted on these shafts are supported by ball bearings; secured pinion gears are subsequently connected to free-wheel sprocket. Whole assembly is transversely mounted on a shaft supported by ball bearings securing an rpm multiplier that is connected to shaft of electric generator. Overall assembly of MWEC is fixed on a floating vessel or a platform deck that is anchored to sea bed. As the approaching wave moves the floating buoy upwards, toothed gear rack, attached to buoy rotates the pinion gear clockwise while the other pinion gear rotates anti-clockwise. This is due to the free wheel sprocket that prevents interference with rotation of pinion gear. On the other hand, for the waves moving floating buoy downwards, toothed gear rack attached to buoy rotates the pinion gear anti-clockwise while the pinion gear rotates clockwise due to free wheel sprocket. Power transmission is through pinion.

Environmental Impact

The whole world is under the threat of pollution. It includes water pollution, air pollution, soil pollution etc. The existing power plants are largely responsible for these threats. Nuclear power plant has radiation hazardousness. Dam or other structure may cause ecological imbalances. It also causes river pollution and salt pollution to the tropical area. Diesel or coal power plant emit huge amount of CO2, SO2 and NO2.These causes acid rain and harvest destruction.

The emission from diesel and coal power plant is highly responsible for Green House effect i.e. global warming. Dams used in the production of tidal power can raise tide levels. Damages like reduced flushing, winter icing and erosion can change the vegetation of the area and disrupt the balance. Whereas, the sea wave power plant is free from any kind of environmental pollution. Wave energy is renewable, clean and unpolluted. There is no carbon dioxide or any other by-products released. It doesn't produce greenhouse gases or other waste. As it is renewable, it will help reduce our reliance on the burning of fossil fuels. Wave is always available so it is reliable.

EXPECTED OUTCOMES

The energy captured is used for all different kinds of useful work, including electricity generation, water desalination and pumping of water.

CONCLUSION

The technology of ocean wave is still juvenile. It has been fairly possible to demonstrate a power generation plan in this paper. It has been manifested that the proposed plan of power generating from wave has some favourable distinct features which makes it possible to be renewable and eco friendly process. Because of the simple design and easy operation it requires low maintenance cost. It requires very few operating cost that makes it the least priced power. Since it is renewable it can be an everlasting process. Its operating cost is incredibly low. Once you have built it, the energy is free because it comes from the ocean's wave power. It is important to estimate what amount of power generation will make a company profitable. For this purpose cost volume analysis has been shown (fig. 3).It will attain revenue which wills surplus total cost at 50Mw. Therefore, wave power plant can be

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constructed due to its sustainability, renewability, eco-friendly and friendly to the environment.

The wave energy resource is extremely large and offers the possibility of environmentally benign energy at moderate cost. There are a range of wave energy concepts which could produce modest and substantial amounts of power. Shoreline devices are already viable in certain locations and could be exploited in many others. Further improvement is needed on wave energy data and data collection methods. On the basis of currently available empirical information, the environmental impacts are expected to be small; however, efforts should be made on environmental effects by wave energy projects. This could be essential to sustainable development of wave energy. Government of Malaysia must increase their support for wave energy research in achieving a balanced energy future.

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