

Floating Type Ocean Wave Power Station: Unique Work of Oscillating Platform

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ABSTRACT

This paper presents the unique wave power station, where a pair of the floats supporting the platform is lined up at the interval of one wave length in the ocean swell/wave and the counter-rotating type hydroelectric unit with the vertical shaft is submerged at the center position of the platform. The station can get sufficiently higher energy than the traditional OWC types. That is, the flow velocity through the runners is two times faster than the oscillating ocean swell, and the platform works fruitfully in acceptable response to the swell oscillation regardless of the weight and the wave length. Besides, the motion of the platform can be predicted numerically and simply by the equation of oscillation.

KEY WORDS: renewable energy; ocean wave power; floating type; platform; oscillation; counter-rotation; hydroelectric unit.

INTRODUCTION

For the next leap in the exploitations of the renewable/sustainable energies, we are under obligations not only to cope with the warming global environment but also to conserve natural ecosystem and to coexist with nature. As for the fluid energy resources in the world, we can newly exploit the hydro-resources of about 2 TW on the land, the wind-resources of about 72 TW and the ocean-resources more than 2×10^3 TW. That is, the ocean-resources should occupy the attention of the sustainable power generation, and it is more required to prepare several kinds of the power unit suitable for the individual ocean circumstance.

At the traditional wave power stations, the ocean swell, which is called in place of the wave to distinguish precisely between the ocean wave and the technical term "wave" as for the physically vibrating/oscillating phenomena, is changed to the oscillating air flow in the caisson or the buoy (OWC), and the air flow rotates the turbines such as Wells types, impulse types (Dorrell and Hsieh, 2008; Korean Fluid Machinery Association, 2007). It cannot be expected unfortunately, however, to get the fruitful output from the above stations, because not only the air density but also the efficiency of the energy conversion in the caisson is very low in the traditional OWC type. Then, the cross-flow type (Choi,

2008) and Wave Dragon type (<http://www.wavedragon.net/>), whose hydraulic turbines are submerged and work in the sea water collected by the intake, have been proposed.

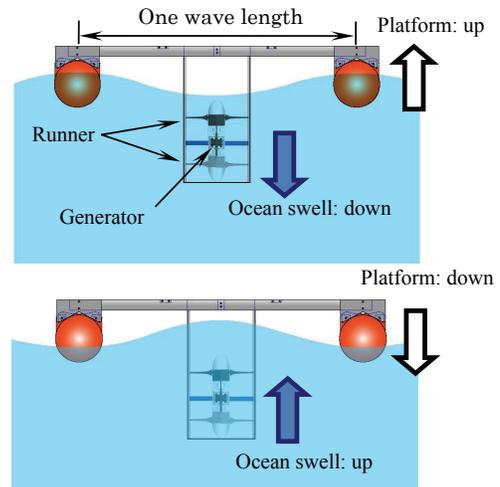


Fig.1 Floating type ocean wave power unit

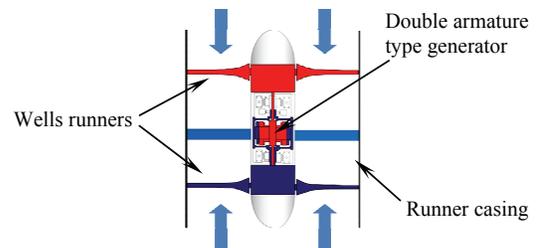


Fig.2 Counter-rotating type hydroelectric unit