

일방향 기구 기반 랙-피니언 기어를 이용한 병진형 파력발전장치에 대한 기초연구

*이 준경, 조 성일, 이 세한, 이 상천, 노 현철

Fundamental Study for Ocean Wave Energy Converter Using a Rack-Pinion Gear Based One-way Mechanism

*Junkyoung Lee, Sungil Cho, Sehan Lee, Sangchun Lee, Hyunchul No

Sustainable energy generation is becoming extremely imperative due to the expected limitations in current energy resources and to reduce pollution. Especially, because of its considerable energy potential, ocean wave energy has been investigated with regard to power generation. To develop large high power wave generator system, it is important to make a small scale proto type and to test that. Thus the objective of this research is to examine the characteristics of a mechanically excited generator system having small power capacity experimentally. The water reservoir (4 m length, 1.5 m width and 1.8 m depth) having a wave maker to make arbitrary height and period of the water wave was made. The proto type consists of three main parts; a buoy, rack-pinion base one-way mechanism, and a wave generator(Fig.1). The water wave is going up and down and the hexahedron buoy is following the wave. The rack gear attached to the buoy is also going up and down to roll the pinion connected to an electric generator then it produces electricity. The experiments were performed with several conditions of water waves, and the power outputs over 30 W could be measured for some conditions. In future works, to achieve higher performance for the proto type, the effects of primary parameters (buoy shape and mass, etc.) on the system efficiency will be identified.

Key words : Ocean Wave energy(파력), Energy Converter(에너지 변환기), One-way mechanism(일방향 기구), Rack-Pinion Gear(랙피니언 기어)

E-mail : *jkleee99@kyungnam.ac.kr

파력발전기의 에너지 회생을 위한 연구

*윤 종일, **안 경관, 딩 광 쩡, 황 후 티엔

A study on design and modeling of a Wave Energy Converter

*JongIl Yoon, **KyongKwan Ahn, Quang Truong Dinh, Huu Tien Hoang

Motions in nature, for example ocean wave, has been playing a significant role for generating electricity production in our modern life. This paper presents an innovative approach for electric power conversion of the vast ocean wave energy. Here, a floating-buoy wave energy converter (WEC) using hydrostatic transmission (HST), which is shortened as HSTWEC, is proposed and designed to enhance the wave energy harvesting task during all wave fluctuations. In this HSTWEC structure, the power take-off system (PTO) is a combination of the designed HST circuit and an electric generator to convert mechanical energy generated by ocean wave into electrical energy. Several design concepts of the HSTWEC have been considered in this study for an adequate investigation. Modeling and simulations using MATLAB/Simulink and AMESim are then carried out to evaluate these design concepts to find out the best solution. In addition, an adaptive controller is designed for improving the HSTWEC performance. The effectiveness of the proposed HSTWEC control system is finally proved by numerical simulations.

Key words : Wave Energy(파력), Wave Energy Converter(파력발전기), Hydrostatic Transmission(정압 전달), Modeling(모델링), Control(제어)

E-mail : *hero9825@hotmail.com, **kkahn@ulsan.ac.kr