

A STUDY ON THE ESTABLISHMENT OF VIRTUAL SYSTEM FOR EFFICIENT OPERATION OF OWC WAVE POWER GENERATOR

JUNG HEE LEE¹, JAEWON OH² and KILWON KIM³

¹Offshore Industries R&BD Center/KRISO, 1350 Geojebuk-ro 53201, Rep of KOREA.
E-mail: jhlee@kriso.re.kr

²Offshore Industries R&BD Center/ KRISO, 1350 Geojebuk-ro 53201, Rep of KOREA.
E-mail: herotaker@kriso.re.kr

³Eco-friendly Ocean Development Research Division / KRISO, 32 Yuseong-daero, 34103, Rep of KOREA E-mail: kimkilwon@kriso.re.kr

This study was conducted to establish a system for the efficient operation of OWC-type wave power generators in actual operation by applying digital twin technology. The OWC wave power generator is a system that generates power by rotating a turbine by the pressure difference between water column air pressure and external air pressure. Ocean waves are characterized by high variability. If the height of the wave suddenly increases significantly, excessive pressure in the water column may cause fatal damage to the turbine. In order to adjust the water column pressure by applying the digital twin technology, it is necessary to develop a system that can control the flow control valve in real time before excessive pressure is applied.

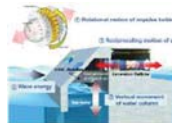


Fig. 1. OWC Wave Power Generator

In this study, a virtual integrated flow analysis physical model including multidisciplinary, which can control the real model in real time, was established. The real-time integrated flow analysis physical model was constructed through reasonable assumptions from the energy conservation equation by setting the control volume including the oscillating water column chamber, turbine, and generator. In order to verify the accuracy of the analysis result using actual operation data, the accuracy of the two signals measured in the time domain was compared using the correlation function.

Keywords: OWC Wave Power Generator, Digital Twin, Real-Time Physical Model, Virtual System, Meta Model, Operation.

Acknowledgement

I would like to inform you that this paper is carried out as “Technology development of digital twin in oscillating water column type for smart operation and maintenance service” project(5/5)(PES4840).

References

1. J.H. Lee, K.Y. Sung, J., Oh, J.S., Choi, and S.G. Cho, *J. Compt. Fluids Eng.*, Vol.25, No.3(2020).