해양 파력 발전 시스템 설계를 위한 부유체 에너지 흡수에 관한 연구

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Study on energy absorption of a floater for design of wave energy generation in ocean

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Basically, A Wave Energy Converter (WEC) is a device which is used in converting the potential energy available into mechanical energy by means of reciprocating motion. Many ocean WECs have and are being proposed and developed and are in different stages on their way to commercialization[1]. Once these WEC are commercialized, a huge unimaginable amount of energy could be harnessed and be brought to the shores by means of energy storage and transport[2].

In order to design a large-scale system like the Pelamis type in the ocean, we need to study the motion of a floater, which is effected by wave characteristics, as well as to study how much energy can be captured by the floater, thus, necessitating for an optimal design of the floating type WEC.

In this paper, using CFD we tried simulating different floating type models of the Pelamis WEC, applying various parameters of length, diameters and Wave heights. Here we consider only the heave and pitch motion, to calculate the energy absorbed by the floater. Other motions are ignored.

We focus on two factors, the wave properties and the floater dimensions. Table 1. shows seven calculated cases of Wave and Floater properties. The wave properties are divided into three classes and the floater properties and classified into two. We find the relation between them and the results are obtained.

Table 1. Calculated Model and Wave Properties

No	Wave Properties			Floater Properties	
	Wave Length [m]	Cycling [s]	Wave Height [m]	Diameter [m]	Length [m]
1	70	6.7	1.0	3.5	25
2	70	6.7	2.8	3.5	25
3	70	6.7	5.6	3.5	25
4	70	6.7	2.8	3.5	30
5	70	6.7	2.8	3.0	20
6	70	6.7	2.8	3.5	20
7	70	6.7	2.8	4.0	20

Hence in all cases discussed above, case I was found to be of most important i.e., the wave height and the angular velocity are the most important factors. Future works include the calculations of combining two floaters for maximized energy capture.

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