

Mooring Analysis of Duct-Type Tidal Current Power System in Shallow Water

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Abstract : The exhaustion of oil and the environmental pollution from the use of fossil fuel are increasing. Tidal current power (TCP) has been proposed as an alternative energy source because of its predictability and reliability. By applying a duct and single point mooring (SPM) system, a TCP device can amplify the generating power and keep its position properly. Because the generating power is proportional to cube of the current stream velocity, amplifying the current speed by applying a duct to a TCP system is an effective way to improve the efficiency of the power device. An SPM system can be applied at any water depth and is highly cost effective. Simple installation and maintenance procedures are also merits of an SPM system. In this study, we designed an SPM system for a duct-type TCP device for use in shallow water. Motions of the duct are investigated to obtain the response amplitude operator (RAO) as the magnitude of the transfer function. Parameters affecting the stability of the SPM system such as the fairlead departure angle, current velocity, and the number of clamp weights are analyzed and/or optimized. Wadam and OrcaFlex commercial software is used to design the mooring line.

Keywords : mooring design, parametric analysis, RAO (Response Amplitude Operator), SPM (Single Point Mooring)

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