P4. Performance Test of OTEC Cycle Using Ejector-Pump

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1. Introduction

Ocean Thermal Energy Conversion(OTEC) is a type of new and renewable power generation that generates electricity by driving the turbine by the working fluid with surface sea water around 26 ° C and deep ocean water around 5 ° C. OTEC is suitable for power generation in areas where high surface sea water temperature such as the equator country is kept constant throughout the year.

But it is not suitable as a target area where the surface sea water temperature fluctuates according to seasons like Korea. However, in Korea, it is easy to take deep seawater from the viewpoint of seafloor topography.

Therefore, additional heat sources from unused heats are secured and used as a heat source for the system. EP-OTEC is a cycle that increases the efficiency of the OTEC system by using an additional ejector and ejector pump in the basic OTEC cycle.

The ejector is composed of two motive and suction inlet and one outlet of discharge. Due to the kinetic energy of the high-pressure fluid flowing from the motive, low pressure is formed in the suction part and the fluid is drawn into the ejector. The basic principle of the ejector is that the fluid introduced from the motive and suction part is mixed and discharged at an intermediate pressure.

The EP-OTEC cycle with ejector allows turbine outlet pressure to be lowered than the basic OTEC cycle, increasing power generation and increasing efficiency. In this study, a performance test of the EP-OTEC cycle at 75 ℃ heat source and 5 ℃ heat sink condition and various conditions was conducted..

2. Result of experiment

Experiments were performed by changing the flow rate on the motive side. As the flow rate of motive increased, the pressure recovery rate (P_d/P_s) increased and the system efficiency was increased. The efficiency of the basic cycle was 9.32%, and it was confirmed that the efficiency of the EP-OTEC cycle exceeded the efficiency of the basic cycle when the flow rate (m_s/m_m) was 0.067 or less, and the efficiency was 9.48% when the flow ratio was 0.05.

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