

Tidal Current Power Development in Korea

Kwang Soo Lee

Principal Research Scientist

Coastal Eng. & Ocean Energy Research Department

Korea Ocean Research & Development Institute

Ansan, P. O. Box 29, Seoul 425-600, Korea

E-mail Address: kslee@kordi.re.kr

Ki-Dai Yum

Jin Soon Park

Jung Woo Park

The Korean peninsula has a number of coastal sites where the rhythmic rising and falling of water level due to tides results in strong tidal current. The kinetic energy of these currents can be efficiently exploited by the use of appropriate current power generating system. Harnessing the kinetic energy of tidal currents is advantageous since impounded water within reservoirs is unnecessary, periodic cycles of tidal currents enable long term estimation of power output, and adverse effects on nearby environment could be minimized. After the evaluation on the applicability of tidal current power plant near the Uldolmok channel in 1986, the KORDI (Korea Ocean Research & Development Institute) has been focusing on developing technology related to tidal current power generation system that could be put into the commercialization and industrialization under the support of the MLTM (Ministry of Land, Transport and Maritime Affairs) since 2001.

In order to evaluate the energy potential and capacity to be developed for commercial plant and to examine the changes in hydro-environmental conditions from TCPP (Tidal Current Power Plant) installation in Uldolmok, a series of comprehensive field measurements and numerical modeling have been carried out.

The key elements of current energy development can be divided into unfolding the technologies involved in power generating facility and supporting structure. Current power generating system is composed of turbine, generator and energy conversion facility. The efficiency of turbine where primarily conversion of energy takes place is an important parameter in the tidal power generating system. Out of many different types of turbine, the helical turbine which is the vertical axis turbine (VAT) has been selected. Under the prospect that the helical turbine would have sufficient efficiency to be put into commercial use, various tests including laboratory model tests,



in-situation experiments and CFD works have been conducted to investigate turbine applicability and possibilities of further enhancing turbine performance.

Types of supporting structures applicable for Uldolmok tidal power are Jacket type, Floating type and Catamaran type. Of these, Jacket type was selected and placed under design after due consideration on the structural stability, economical viability, power generating performance and efficiency of construction. Prior to the commercial plant, the pilot TCPP with a capacity of 1MW was designed and constructed. To enhance the efficiency of the generating system, research works are being conducted in the pilot TCPP including monitoring of the structural stability diagnose system. The basic development plan of Uldolmok tidal current power plan will be established on the basis of experimental results from the pilot TCPP and evaluating a numerical model on seawater flow to be on remunerative terms, while securing routes for local vessels travelling the channel. The development of TCPP at other sites will be followed.