



Wave-induced current considering wave-tide interaction in Haeundae

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The Haeundae, located at the south eastern end of the Korean Peninsula, is a famous beach, which has an approximately 1.6 km long and 70 m wide coastline. The beach has been repeatedly eroded by the swell waves caused by typhoons in summer and high waves originating in the East Sea in winter. The Korean government conducted beach restoration projects including beach nourishment (620,000 m³) and construction of two submerged breakwaters near both ends of the beach. To prevent the beach erosion and to support the beach restoration project, the Korean government initiated a R&D project, the development of coastal erosion control technology since 2013. As a part of the project, we have been measuring waves and currents at a water depth of 22 m, 1.8 km away from the beach using an acoustic wave and current meter (AWAC) continuously for more than three years; we have also measured waves and currents intensively near the surf-zone in summer and winter.

In this study, a numerical simulation using a wave and current coupled model (ROMS-SWAN) was conducted for determining the wave-induced current considering seasonal swell waves (H_s : 2.5 m, T_p : 12 s) and for better understanding of the coastal process near the surf-zone in Haeundae. By comparing the measured and simulated results, we found that cross-shore current during summer is mainly caused by the eddy produced by the wave-induced current near the beach, which in turn, is generated by the strong waves coming from the SSW and S directions. During other seasons, longshore wave-induced current is produced by the swell waves coming from the E and ESE directions. The longshore current heading west toward Dong-Back Island, west end of the beach, during all the seasons and eddy current toward Mipo-Port, east end of the beach, in summer which is well matched with the observed residual current. The wave-induced current with long-term measurement data is incorporated in simulation of sediment transport modeling for developing coastal erosion control system in Haeundae.