



Wave characteristics and hydrodynamics at a reef island on Dongsha Atoll in the South China Sea

Shih-Feng Su (1), Te-Yun Chiang (1), Yi-Hao Lin (1), and Jia-Lin Chen (2)

(1) Department of Water Resources and Environmental Engineering, Tamkang University, Taipei, Taiwan (ssf@mail.tku.edu.tw), (2) Department of Hydraulic and Ocean Engineering, National Cheng Kung University, Tainan, Taiwan

An inhabited coral reef island, located at the Dongsha Atoll in the northern South China Sea, is frequently attacked by typhoon waves. Coastline has suffered severe erosion and coastal inundation during certain typhoon paths. Groins were therefore built surround the island to stabilize the shoreline. However, the engineering structures redistributed the characteristics of hydrodynamics, which resulted in the disappearance of seasonal sediment movements on the reef flat. Additionally, infragravity waves (20-200 sec) on reefs have be found to generate strong resonance during energetic wave events. To understand wave characteristics and nearshore circulations around the reef under typical waves and typhoon waves, a phase-averaged and a phase-resolving wave models validated with previous field experiments are used to simulate significant wave height, wave setup and reef circulations. The phase-resolving model is specially applied to investigate infragravity motions around the island. Model results will illustrate the spatial variations of infragravity-wave field and wave-induced nearshore circulation and can provide information for coastal management and protection.