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Study of Design Water Level Elevations in hotspots of Hormozgan Coastline

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Abstract

In this paper, design water level elevations due to wave, tide, wind and barometric pressure are calculated in hotspots including the ports of Kong, Lengeh, Shahid Rajaiee, Kuhmobarak, Sirik and Khuran. The effect of global water level rise is also considered. This modelling is performed utilizing MIKE21 developed by DHI Water and Environment. In order to calculate wave and tide setup, comprehensive and exhaustive studies of wave propagation and tidal levels modelling, which have been performed in last parts of Monitoring and Modeling Project of Coastal Zones of Hormozgan, are used. Also, wind-induced water level variations model is developed to calculate wind setup in various return periods. The results of the study present values of setup due to above mentioned phenomena which can be used in marine structures designs.

Introduction

Sea level is a measurable quantity and it can be generally defined as the results of some influences, including tides, waves, atmospheric pressure, winds, thermal effect, seismic activity (tsunami), vertical land movement, oceanographic effects such as El Niño, etc., which affect the height of sea surface (Aung et al. 1998). The study of coastal erosion, the gradual change of coastline, the cross-shore profile change and the safe design of coastal structures such as groins and jetties is a function of design water level in coastal areas.

Zervas (2001) analyzed monthly mean sea level (MSL) variations for 117 stations of the National Ocean Service's (NOS) National Water Level Observation Network (NWLON) having between 25 and 146 years of data. In this study, monthly MSL data up to the end of 1999 are used to calculate linear trends, and to obtain the average seasonal cycle, the residual time series, and the autoregressive coefficient of the residual with accurate estimates of standard errors. Bondar (2007) have been analyzed the water budget of the Black Sea and the sea level variations at different coastal zones for highlighting the influence of the river – sea interactions. Huang et al. (2008) evaluated GEV model for frequency analysis of annual maximum water levels in the coast of United States.

In this paper, study of design water level elevations in hotspots of Hormozgan coastline is performed utilizing MIKE21. The values of setup due to wave, tide, wind and barometric pressure, along with setup due to global sea level rise are calculated in the return periods of 2, 5, 10, 20,100 years in hotspots of Hormozgan province coasts. These values can be effectively used in designing of marine structures.