University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

APPLICATION OF MATHEMATICAL MODELLING FOR ASSESSMENT OF NEARSHORE WAVE CLIMATE

By
D.P.L.RANASINGHE

THIS THESIS WAS SUBMITTED TO THE DEPARTMENT OF CIVIL ENGINEERING OF THE UNIVERSITY OF MORATUWA IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR DEGREE OF MASTER OF SCIENCE

DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF MORATUWA
MORATUWA
SRI LANKA

2008

91200

University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Abstract

In Sri Lanka, nearshore wave climate is influenced by the simultaneous occurrence of swell waves approaching from a more or less southerly direction and sea waves mainly influenced by monsoonal weather pattern. Some nearshore areas are also vulnerable for occasional impact of cyclonic wave conditions. This complexity and high degree of temporal and spatial variability of waves clearly emphasize the need for accurate assessment of near shore wave climate.

The lack of wave recordings at nearshore location restricts the assessment of nearshore wave climate to some extent. This deficiency in wave data can be overcome by transforming waves from location at which wave data are available through wave propagation modelling. This research study is aimed to develop two dimensional mathematical model based on an irregular wave description capable of simulating wave propagation from offshore to nearshore considering wave transformations due to shoaling, refraction , wave breaking and bottom friction dissipation. The wave conservation equation and the model of Battjes and Janssen were used as the basis to develop the model.

Galle (70m depth) is considered as offshore location which represents the entire deep water wave climate off the southern offshore coast. Hambantota (17m depth) and Kudawella(I5m depth) were selected as nearshore locations to establish the directional wavestatistics for swell and sea waves by applying the developed mathematical model.

Finally based on obtained nearshore wave data base, predictions for extreme wave conditions were made as design wave parameters for coastal and harbour structures. Extremewave heights analysis were done for both offshore and nearshore locations in southerncoast of Sri Lanka using two statistical extreme value probability distributions, namely Gumbel (Fischer-Tippet Type 1) distribution and the Weibull distribution