

FORECASTING OF DAMAGE LEVEL OF MARITIME STRUCTURES CAUSED BY TYPHOONS BASED ON CENTRAL PRESSURE METHOD

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The purpose is to forecast the number of damaged maritime structures at each coast for each pass of typhoons from the central pressure of typhoon at a latitude of 30° N.

Typhoons strike the island of Kyushu in the west of Japanese archipelago a few times a year. Damage of the maritime structures (e.g. breakwaters, seawalls, sea dikes, jetties, wharves etc.) due to storm surge and wind waves frequently are occurred along the coast of Kumamoto and Nagasaki Prefectures. The coastline in these prefectures is complex. It faces open and closed seas. The coastline is divided into 8 coastal regions. Each region has different topographical characteristics.

Typhoons which pass through the island of Kyushu have many tracks. The typhoons, which passed through an area delineated by a latitude of 30° and 35° N and a longitude of 127° and 132°E, between 1980 and 1994 were divided into 13 groups based on their paths and the direction of coastlines to the sea area. The central pressures of the typhoon at a latitude of 30°N are classified into six regions from 1 to 8.

The number of damage cases of maritime structures caused by each typhoon during 15 years is classified into their six regions. The formulas that show the regions are presented. Therefore, the vulnerability of maritime structure at each coast for typhoon path is obviously evaluated by the relation of the number of damage cases and the central pressure.

Considering the effect of storm surge and wind waves on the maritime structure damage, not only the wind speed but also the central pressure of typhoon is important. In this paper, the central pressure is based on the maximum wind speed near typhoon center. From a relationship between the central pressure of typhoon and this weakness value, an index of vulnerability of each coast for the typhoons of same rank is defined. The obtained value indicates the relative weakness of each coast for each typhoon. By using this vulnerability index, the number of damaged structures by a coming typhoon at each coast can be estimated when the typhoon passes through 30 degrees north latitude.

The conclusion shows that the central pressure method can be used to estimate the damage level of maritime structures that will occur along the coast before a typhoon strikes. The forecasting method reported here will be used for the purpose of coastal zone management in disasters prevention works. Further, it is useful for information of storm warning and evacuation for residents along the coastlines.

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