

# **Behavior of marine pile under dynamic earthquake loading**

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## **Abstract**

Earthquake is one of the most destructive phenomena in nature. Iran country is located on the high risk zone of world earthquake chain resulting to serious dilemma in every few years. The number of serious earthquakes in coastal area of our country in last few years has been considerable (e.g. Occurrence of earthquake in Bandarabbas, Gheshm Iland, etc. in 2005 and 2006). Inclined pile performance against lateral loading is much better than vertical ones. However their design and construction are difficult. Therefore the vertical marine piles are more common structural elements to handle and conduct different environmental loadings through deep sea bed level where the soil provides enough strength as a safe foundation. In this study the nonlinear behavior of vertical marine piles under earthquakes has been investigated, structure and soil has been modeled using Plaxis Software. The soil characteristics such as  $\phi$  and  $c$  was obtained by in-situ field study in coastal area of Bandarabbas. Running model for a critical condition of lateral and vertical Dynamic loading for a set of sample marine piles time history of pile displacement was obtained. The decreasing rate of shear stress coefficient respect to bed depth was graphically presented. The results showed promising for optimum and reliable pile design of harbors and offshore structures not only in the vicinity of the study area, but also for a wide range of the coastal zone of southern part of Iran.

## **1-Introduction**

Iran country has a long marine boarders in north and south. This intension is associated with a variety soil parameters and different layers. Numerical modeling is important tools to estimate the vertical and lateral settlement of marine piles in the costal zone.

In this paper plaxis ver.7.29 software was employed to simulation the soil-pile interaction due to earth quake loading.

## **2-theoretical back ground**

soil-pile interaction analysis can be performed in following ways:

- a)Method based on maximum lateral soil pressure
- b)Method of bed reaction(vinkler method)
- c)Method of continuous medium
- d)Finite element method

2-a)In first method the ultimate values can be obtained. Hansen(1961)employed this method to obtain the maximum moument as:[2]