ABSTRACT
The fatigue life of component with corrosion damage was investigated. Model was established to analyze the stress of component in offshore platform subjected to wave loads and corrosion damage by elasticity theory. The stress behavior in the vicinity of damage under certain corrosion condition was analyzed, and the fatigue life and damage of a component were predicted on the basis of damage mechanics. The result indicates that the initial damage will affect the stress, fatigue life and future damage of component.

KEY WORDS: Ocean component; corrosion; damage; stress; fatigue life.

INTRODUCTION
The component subject to the action of load and corrosion is prone to corrosion fatigue and the accumulation of damage will lead to fracture. Therefore, the estimation of corrosion fatigue life is important for the safety of components. There are many researches on corrosion fatigue life, especially in recent 20 years, along with the development of the method and equipment of experiment. The behavior of short crack has been investigated and the studies indicate that short fatigue cracks play a key role in determining an ultimate life of an engineering component (Murtaza and Akid, 1995, 1996). Turnbull et al (1996) proposed that corrosion fatigue include stages of pit initiation, pit growth, crack initiation, short crack growth and long crack growth. Because the fracture mechanics based on existing crack is not suitable for short cracks initiated from pits, some revised approaches to modeling short fatigue growth data is proposed (Angelova and Akid, 1998, Zhou and Turnbull, 1999).

According to the previous researches of corrosion fatigue, we can obtain conclusions mainly as follows:

(i) Pitting corrosion is a precursor of fatigue crack initiation and growth (Harlow, 2006), and during corrosion fatigue process, corrosion pits acted as pre-existing flaws in the material to nucleate fatigue crack (Pokhmurskii and Khoma, 2004, Ishihara et al, 2006), and fatigue crack will grow in competition with corrosion (Harlow and Wei, 2001).

(ii) The presence of corrosion damage will reduce the fatigue lives of components (DuQuesnay, et al, 2003), and the threshold of stress will decrease along with the accumulation of damage, (Svensson, 2002). Dolley et al (2000) thought that the reduction in fatigue life depended upon the pre-corrosion time and in turn the initial pit size.

(iii) Wei (2002) proposed that the fatigue life of a specimen, or component, is determined by the time required to grow a pit to a sufficiently large size to effect crack nucleation, and by the subsequent cycles of crack growth to produce fracture.

(iv) DuQuesnay et al (2003) proposed that the depth of corrosion pit can be taken as parameter for characterizing the corrosion damage and predicting the fatigue life.

Previous studies were mainly focused on the aircrafts (Harlow and Wei, 2001, DuQuesnay, et al, 2003), few on the ocean components. For the component on platform, corrosion medium will make it possible to form pits too, and create stress concentration in the vicinity of pits under load from wave and wind on platform so that the initiation of crack begins and the macro crack will further conduct corrosion fatigue. On the other hand, some literatures study fatigue life mainly based on experiment (Zhou and Turnbull, 1999, Dolley, et al, 2000, Ishihara, et al, 2006), and deduced experiential formulation from test data, but it is not common because of test time is very long and usually points to especial material or load.

Hence, the purpose of this study is to propose a theoretical analysis method for computing stress and fatigue life of component with corrosion damage on platform. In this paper, the sample is a vertical circle cylinder component under wave load, and the stress of component damaged by corrosion was analyzed by elasticity theory, and the formulation of fatigue life was derived through damage mechanics.

PHYSICAL MODEL AND ITS ANALYSIS

Description of Model
The physical model for describing the behaviors of the component in