CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Earthquakes are one of the world's most devastating and frightening natural disasters. Undoubtedly, we are deeply clear of the hazards, effect and damage caused by this unpredicted earthquake. Basically, earthquake does not kill people, but collapsed buildings and their content do. The greatest hazard in the earthquake is the collapse or fall of man-made and natural structures that caused the extensive loss of life and property. As a result, the seismic effects may not only consider in the countries that have a high risk of a strong earthquake, but also for those countries that are subject to low-to-moderate earthquake for instance like Malaysia since the power of the earthquake has shown us it is unpredicted (Ramli & Adnan, 2004).

Most of the Malaysians may feel that the country is generally free from any major active seismic activities, as a consequence of its strategic location. In fact, positioned at the periphery of the ring of fire and beside the Philippines and Indonesia, two neighbouring countries which have seen violent occurrences of seismological activities, the possibility of being jolted by moderate earthquake cannot be excluded. Moreover, Malaysian Meteorological Department (MetMalaysia) had detected the occurrence of eight earthquakes in East Malaysia which in the magnitude range of 2 to 4.5 Richter scale.
in the year 2012 (The Malaysian Insider, 2013). Even the Malaysia Peninsula has experienced earthquakes of local origin which associated with active fault that happens in Bukit Tinggi area from year 2007 to 2009 (New Straits Times, 2012).

The exploration and production activities in oil and gas industry remain vital for economy in Malaysia, where the fixed offshore platforms involve the most in the operation (Aulov & Liew, 2013). But then, the current Malaysian offshore structural design practice focused more on wind and wave effects analysis rather than seismic effect, even the parts of Sabah and Sarawak coastal waters are very close to the seismically active zone.

1.2 PROBLEM STATEMENT

Malaysia is located beyond the seismically active zones, but it is still questionable whether the numerous fixed offshore structures in the Malaysia region shall be designed to withstand an earthquake ground motion. In fact, parts of Sabah and Sarawak coastal waters are very close to the seismically active area and we experienced and felt the tremors truly owing to the earthquakes occurred in the neighbouring countries.

The current Malaysian offshore structural design practices focus more on wind and wave effects analysis rather than seismic effect. But, we cannot ensure the fixed offshore structure is safe at a specific level of earthquake acceleration. Therefore, the necessity of seismic design consideration for fixed offshore structure in Malaysia due to surrounding earthquake should be determined.

1.3 RESEARCH OBJECTIVE
There are many matters that require to be analysed in this research, but the main objectives of this research are:

i. To apply surrounding earthquake ground motion for analysis of an offshore structure in Malaysia

ii. To determine the seismic vulnerability of existing offshore structure in Malaysia

iii. To identify the necessity of the implementation of seismic design consideration for offshore structure in Malaysia due to surrounding earthquake

iv. To determine the seismic design criteria for fixed offshore structure located in Malaysia

1.4 SCOPE OF STUDY

The scopes of this study are:

i. The type of offshore structure used will be 4-legged fixed offshore structure

ii. The case study will be conducted in the surrounding earthquake region that affected the offshore platform in Malaysia

iii. The following seismic analyses have been carried out to determine the seismic response of a fixed offshore structure:

   - Free vibration analysis has been carried out to obtain the natural period and the mode shape of the fixed offshore structure