

# CHAPTER I

## INTRODUCTION

### 1.1 Background of the Study

Bridge is an important construction to connect separate area due to natural appearance such as valley and waters like river and lake. Bridge has a big role to transport human and vehicle from one place to another place.

Indonesia is the biggest archipelago country in this world. Indonesia has about 16056 named islands that had been registered to PBB. With this condition, Indonesia still need many bridge to be built to connect these islands. According to Directorate General of Highways, total islands in Indonesia is about 88000 and this number is still small wondering all the islands Indonesia had.

Time by time passed, and bridge continuously develop in its form and the material that used in it. Starting from wooden bridge, concrete bridge, and now is the era to use steel cable technology in bridge, like cable stayed bridge and suspension bridge. This kind of bridge is usually used for long span bridge. Beside to reduce the construction cost, bridge with steel cable technology is trusted to stand strongly and bear the loads.

The construction of bridge continuously developed and engineers continuously do the research about bridge engineering design, especially in long bridge. Nowadays, dynamic response of bridge due to the loadings one of popular focus in bridge engineering. To design a long bridge is not an easy work, especially to apply all the load in the and see the dynamic

response of the bridge. Many engineers had study about Dynamic Amplification Factor (DAF), a simple method to design a bridge. Dynamic Amplification Factor is a ratio of dynamic response through static response of a bridge. An accurate evaluation of Dynamic Amplification Factor (DAF) will lead to safe and economic design for a new bridge.

Bridge dynamic response can be reached with applying the dynamic load in the bridge model. Dynamic load is a time dependent load that has different value as time goes. In this study, it will be used the seismic load as the dynamic load. Seismic load is a dynamic load caused by land movement due to earthquake. Dynamic Amplification Factor (DAF) then be reached by dividing the dynamic response to static response of bridge structure, where in this study, dynamic response is the response of bridge by applying the combination of the bridge's own weight and dynamic load, whereas the static response is the response of the bridge that just be influenced by the bridge's own weight.

## **1.2 Objective of the Study**

The purpose of this study is to calculate and observe the Dynamic Amplification Factor (DAF) of the girder and pylon in the certain points along bridge span due to seismic load.

This study could be a reference for calculating Dynamic Amplification Factor (DAF) that can be used to design a safe and economic cable stayed bridge.

### 1.3 Scope of the Study

Based on the problem explained, then the author made a scope of the study as the guidance to working and writing this study, they are:

1. The bridge structure to be analysed is Cable Stayed Bridge, fan type
2. Seismic data to be used is seismic data from Batam, calculated based on SNI 2833:2016 to get the spectrum response, and then convert to time history to be applied to the model.
3. The seismic load is only applied in transverse direction
4. Bridge profile and dimension be modelled just like Cable Stayed Bridge, fan type
5. The dimension of bridge components is fictive and oriented to Barelang Bridge
6. Loads applied in structural analysis are seismic load and bridge's own load
7. Structural analysis is done in three dimensional model using SAP2000 vers. 19
8. Structural analysis is done in two versions of analysis, the first one is static analysis with only considering the bridge's own load, and another one is dynamic analysis that considering both the bridge's own load and seismic load
9. Structural analysis is done to calculate the Dynamic Amplification Factor (DAF)
10. The DAF will be calculated related to moment, shear, axial, and the deflection (UZ deformation)

## 1.4 Writing Systematics

The writing of this study is based on writing systematics that had been determined to make a good writing. The writing systematics is just made in some chapter and defined like this.

### **CHAPTER I Introduction**

This chapter is including background of the study, objective and the benefit of the study, scope of study, and the writing systematics.

### **CHAPTER II Literature Review**

This chapter is about study and theory of cable stayed bridge, dynamic load, response spectrum, and Dynamic Amplification Factor (DAF).

### **CHAPTER III Research Methodology**

This chapter serve the method and procedure from the start to reach the final of this study.

### **CHAPTER IV Result and Discussion**

This chapter serve the calculation to reach the Dynamic Amplification Factor (DAF) of the certain points along bridge span. This chapter is also including the result and the discussion of the study that is served in figure, graph, and table.

### **CHAPTER V Conclusion**

In this chapter, the conclusion and suggestion about the study are served.