CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

This chapter will discuss about the method that are used to illustrate the model, analysis and design the structure. Finite element method is use to analyse the structure of all the dome and its behaviour upon the loading applied. This research will illustrated these five dome with the same specification of particular size of the dome, which is the span (S) is 40 meter, the rise (H) is 7 meter, the sweep angle (A) is 43 degree, the radius (R) is 30 meter and the central angle is 86 degree. Only difference between the domes is the grid pattern that will be illustrate.

For modelling the dome in this research will use the interactive programming language called ‘Formian’ which is provide a suitable medium for formex configuration processing. Formian is the basic concept of the Formex Configuration Processing programming on how to arrange the parts of formex algebra. The total summation that include in this research are five domes which are one of Ribbed dome, two of Schwedler domes and other two of Lamella domes. The modelling need to be perform use the Formian to form the configuration and to illustrate the composite transformations of these domes.

In order to compare the structural behavior of the dome in term of buckling, the finite element software LUSAS programming analysis will be use. To analysis the structure, need to decide the properties of the structure of domes. Besides that, basically the information
about the structure have been taken from the previous research, such as the load. The finite element software LUSAS programming analysis will analyse the structure and come out with the result.

### 3.2 FLOW CHART OF PROJECT METHODOLOGY

![Project Flow Chart](image)

**Figure 3.1:** Project Flow Chart
Figure 3.1 shows a project methodology which involved numbers of steps that have been taken in order to complete this study. The first part was set the objective and literature review. In order to analysis the structure, first of all need to do some studies from previous research to decide the properties of the structure of domes. As example the material properties and geometric properties. Hence, basically the information about the structure of the domes have been taken from the previous research, such as self-weight load or dead load and fabric load.

After selection of the dome had decide to be illustrated, the modelling using the Formian programming as shows in Figure 3.2 is the second step. In order to illustrate the formex configuration, it is a need to overview of the basic aspects of this programming language. All of the five domes would have the same number of ring and the rib around the domes. The different is the context of a structural configuration, such as the basic formex composition of the signet, the cantle and the formex itself.

![Formian Programming Software](image)

**Figure 3.2: Formian Programming Software**

Third step is to import the model to the LUSAS software as shows in Figure 3.3, after done with the illustrate from the Formian programming. Next step is to apply the properties and assign the loading to the model that imported. Include the material properties, geometric properties, self-weight load or dead load, fabric load and others. Followed by the step of run the analysis to determine the buckling, stress and strain. Lastly, by obtaining the result, the