# **CHAPTER 4**

# **OPTIMIZATION AND DESIGN**

In previous chapter, electrical and mechanical design parameters of the selected axial flux permanent magnet generator are expressed. To do that, mathematical design equations and related drawings are represented. These equations are important for this thesis work because they are used in the main design code, which is written in MATLAB. Also in the previous chapter, verification of the given analytical equations of the some important design parameters is given by means of finite element analysis for a sample design. In this chapter, optimization parts of the given design are summarized and optimum design parameters of the proposed 5 MW AFPM generator are determined. First, evolutionary algorithms (EA) are reviewed including the selected genetic algorithm (GA). Then, parts of the genetic algorithm based optimization method are explained in detail. Optimization of the proposed generator is constructed with MATLAB optimization toolbox. Also in this chapter, a brief information of this toolbox is given. Finally, optimized design parameters of the proposed 5 MW 12 rpm AFPM generator are given.

## Introduction

## Evolutionary Algorithms and Genetic Algorithm

## Genetic algorithms based optimization

## MATLAB GA Toolbox Implementation

## 5MW AFPM generator with optimized design parameters

**References**