

TABLE OF CONTENT

CHAPTER I: INTRODUCTION	1
1.1. Background Lssues	1
1.2. Formulation Of The Problem.....	6
1.3. Research Objectives & Benefits	7
1.4. Authenticity Of Research	7
1.5. Writing System	8
CHAPTER II: LITERATURE REVIEW & BASIC THEORY.....	10
2.1. Literature Review.....	10
2.2. Basic Theory.....	15
2.3. Type of Turbines.....	16
CHAPTER III: METHODOLOGY	23
3.1. Research Model	23
3.2. Tools and materials used	25
3.3. Research procedure.....	25
3.4. Proposed design Potential Wind Energy Model based on Fuzzy Logic.....	30
3.5 Fuzzy Mamdani for Eco-Green Suitable Wind Turbine Power Plant in Sahara Desert, Libya Proposed model	36
CHAPTER IV: RESULT AND ANALYSIS.....	42
4.1. Output Fuzzy Analysis	42

4.2 Turbin Rotation Potential	52
4.3 Turbin Torque Potentials	55
4.4 Potential Of The Power Production Analysis	58
CHAPTER V: CONCLUSION	64
5.1. Conclusion	64
5.2. Recommendation	64
REFERENCES	65



LIST OF FIGURES

Figure 1.1 Wind energy: global capacity (blue) and forecast (red).....	2
Figure 1.2 Access To Electricity Of Libya	6
Figure 2.1. Wind Turbine Components	16

Figure 3.1 Research system model of the potential wind turbine power plant in Sahara Dessert, Libya	23
Figure 3.2 Proposed System Model	24
Figure 3.3 Research procedure flow chart	26
Figure 3. 4 propose system model of fuzzy logic of eco-green wind turbine development in Sahara Desert, Libya	30
Figure 3. 5 Wind Speed (m/s) Fuzzification	31
Figure 3. 6 Winde of Rotor (m2) Fuzzification.....	31
Figure 3. 7 Blade of turbine (m) fuzzification.....	32
Figure 3. 8 Rotation Per Minutes (RPM).....	32
Figure 3. 9 Torque of Turbine (Newton).....	33
Figure 3. 10 Power Production of Wind Turbine (Watt).....	33
Figure 3.11 Fuzzy rules of the propose model (a) inference model and (b) rules models	35
Figure 3.12 Low degree membership function of wind speed parameter	36
Figure 3.13 Normal degree membership function of wind speed parameter	37
Figure 3.14 High degree membership function of wind speed parameter.....	37
Figure 3.15 Low degree membership function of wide of rotor parameter.....	38
Figure 3.16 Normal degree membership function of wide of rotor parameter ...	39
Figure 3.17 high degree membership function of wide of rotor parameter	19
Figure 3.18 Low degree membership function of blade turbine diameter parameter.....	40
Figure 3.19 Normal degree membership function of blade turbine diameter parameter	40
Figure 3.20 High degree membership function of blade turbine diameter	41
Figure 4.1 Fuzzy Output analysis of turbine rasion with low output	42
Figure 4.2 Fuzzy Output analysis of turbine rotation with normal output	43
Figure 4.3 Fuzzy Output analysis of turbine rotation with high output.....	44

Figure 4. 4 The output analysis of the low membership degree of turbine torque.....	45
Figure 4.5 The output analysis of the normal membership degree of turbine torque.....	46
Figure 4.6 The output analysis of the high membership degree of turbine torque.....	47
Figure 4.7 The output analysis of the low membership degree of power productions.....	48
Figure 4.8 The output analysis of the normal membership degree of power productions.....	49
Figure 4.9 The output analysis of the high membership degree of power productions	50
Figure 4. 10 The output analysis of the 3D membership degree of turbine rotation.....	50
Figure 4. 11 The output analysis of the 3D membership degree of power turbine rotation.....	51
Figure 4. 12 The output analysis of the high membership 3D of the turbine torque.....	51
Figure 4. 13 The output analysis of the high membership 3D of the turbine torque.....	52
Figure 4. 14 Comparative analysis of potential turbine rotation and wind speed analysis	53
Figure 4. 15 Comparative analysis of potential turbine rotation and wide of rotor analysis	54
Figure 4. 16 Comparative analysis of potential turbine rotation and Blade Turbine Diameter (m) analysis	55
Figure 4. 17 Comparative analysis of potential turbine torque and wind speed analysis	56
Figure 4. 18 Comparative analysis of potential turbine torque and wide of rotor analysis	57
Figure 4. 19 Comparative analysis of potential turbine torque and Blade Turbine Diameter (m) analysis	58

Figure 4. 20 Comparative analysis of potential turbine rotation and the results of power production analysis.....59

Figure 4. 21 Comparative analysis of potential turbine torque and the results of power production analysis60



LIST OF TABLES

Table 1.1. Population Of People in Libya	5
Table 2.1. High-speed shaft and Low-speed shaft	17
Table 3.1 The turbine specification data of wind FD16-20 Kw	27
Table 3.2 Wind Speed in Sahara Desert year of 2000-2020	28
Table 3.3 Manual measurement of wind turbine production based on demand and request of renewable energy needs	29
Table 3.4 The rules of proposed model for potential wind power energy in Sahara Dessert, Libya	34
Table 4.1 Measurement Analysis of Turbine rotation; conventional and Fuzzy Mamdani model	53
Table 4.2 Measurement Analysis of Turbine Torque; conventional and Fuzzy Mamdani model	56
Table 4.3 Power production analysis of wind turbine based on demand of wind power production.....	59
Table 4.4 Estimated yield of wind energy production based on average wind speed from 2000 to 2020 in the Sahara Desert, Libya.....	62