Centre d'Etudes Doctorales : Sciences et Techniques de l'Ingénieur

AVIS DE SOUTENANCE

THESE DE DOCTORAT

Présentée par

Mme : ZINEB AQACHMAR

Discipline **:** Sciences de l'Ingénieur

Spécialité : Génie Energétique

Sujet de la thèse : Solar sources of electricity injected to the grid and modelization/ parametric study of concentrated photovoltaic solar cells and power plants.

Formation Doctorale : Sciences de l'ingénieur Sciences Physiques, Mathématiques et Informatique.

Thèse présentée et soutenue le samedi 06 février 2021 à 10h au Centre de conférences devant le jury composé de :

Nom Prénom	Titre	Etablissement	
Mostafa MRABTI	PES	Ecole Nationale des Sciences Appliquées de Fès	Président
Abdelfettah BARHDADI	PES	Ecole Normale Supérieure de Rabat	Rapporteur
El Bakkay HAJJI	PES	Ecole Nationale des Sciences Appliquées Oujda	Rapporteur
Saad BENNANI DOSSE	PES	Ecole Nationale des Sciences Appliquées de Fès	Rapporteur
Abdellah MECHAQRANE	PES	Faculté des Sciences et Techniques de Fès	Examinateur
Ghizlane KHAISSIDI	PH	Ecole Nationale des Sciences Appliquées de Fès	Examinateur
Khadija LAHRECH	PH	Ecole Nationale des Sciences Appliquées de Fès	Directeur de thèse

Laboratoire d'accueil : Informatique et Physique Interdisciplinaire

Etablissement : Ecole Normale Supérieure de Fès

Centre d'Etudes Doctorales : Sciences et Techniques de l'Ingénieur

Titre de la thèse : Solar sources of electricity injected to the grid and modelization/ parametric study of concentrated photovoltaic solar cells and power plants.

Nom du candidat : Zineb AQACHMAR

Spécialité : Génie Energétique

Résumé de la thèse

While taking into consideration the excellent political stability of the Kingdom of Morocco, it's very high solar irradiation, and its interconnection to the Spanish electrical grid, the 1st Moroccan large scale solar power plant injecting electricity to the grid Noor I is studied. It is shown that Ouarzazate city was chosen as a location of Noor I due to the acceptable wind speed there, the exceptionally high direct normal irradiance, the proximity to the grid, and the proximity to water resources in this region.

The miscellaneous recent numerical and experimental studies about solar energy for electricity production are studied[1]. An audit, and a statistical classification of the solar power plants installed worldwide are made. The solar technology with the best environmental performances is the concentrated photovoltaics that is studied.

The study of the equivalent electronic circuit of the concentrated photovoltaic cell is made; a mathematical modelization of the electronic equivalent circuit of the concentrated photovoltaic solar cell is given, parametric studies are made under MATLAB environment. Furthermore, the feasibility of large scale CPV power plants in the six Moroccan principal climatic zones is conducted.

KEYWORDS

Electronics, Renewable energy, Photovoltaic, concentrated photovoltaic, Electricity, Energy, Concentrated Solar Power, Parabolic Trough Collector, Thermal Energy Storage, Morocco, Water cooling, Concentrated photovoltaic, CPV, Policy recommendations, Sensitivity study, Parametric analysis, MATLAB, GIS maps, ArcGIS, System Advisor Model, Noor I, Solar power plants.