



Ahmed Amine Hachicha

Curriculum Vitae

Overview

Assistant professor, solar energy, thermo-fluids engineering, concentrated solar power, computational fluid dynamics, numerical modeling, nanofluids, environmental factors.

Education

Oct2008–
Sep2013 **PhD degree in thermal engineering with the highest academic degree awarded (Cum Laude)**, *Polytechnic University of Catalonia UPC*, Barcelona (Spain).

Title Modelling and numerical simulation of a parabolic trough solar collector

- Implementation of a new optical model to accurately calculate the solar distribution around the heat collector element taking into account the solar angle.
- Development of a general thermal model to predict accurately the heat losses and thermal performances of a parabolic trough solar collector.
- The study of the wind flow around a parabolic trough solar collector and its effect on the stability and the heat transfer around the solar receiver using Large-Eddy Simulations techniques.

Oct2008–
Jul2010 **Master degree in energy engineering** , *Polytechnic University of Catalonia UPC*, Barcelona (Spain).

The use of CFD in the numerical simulation of thermal process (solar application: modelling and numerical simulation of a parabolic trough solar collector)

Sep2006–
Oct2008 **Master degree in energy engineering**, *National School of Engineering of Tunis ENIT*, Tunis (Tunisia).

Numerical simulation of conduction, convection and fluid flow using Computational Fluids Dynamics (CFD) techniques (application to solar water storage tank).

Sep2004–
Jun2007 **Industrial engineer**, *National School of Engineering of Tunis ENIT*, Tunis (Tunisia).

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Final project of engineering studies: Development of a new Computerized Management of Maintenance System CMSS and FMEA Process in Valeo Ezzahra.

Awards: **Sharjah Islamic Bank Award for distinguished research 2020**, United Arab Emirates.

Summer research visit 2015, Polytechnic University of Catalonia UPC, Barcelona (Spain).

Special doctoral award for the most outstanding doctoral thesis 2015, Polytechnic University of Catalonia UPC, Barcelona (Spain).

PhD scholarship 2008-2013, Spanish Agency for International Development Cooperation AECID, Spain.

Master scholarship 2007-2008, Polytechnic University of Catalonia UPC, Spain.

Publications-Referred Journal

- I. Khakpour, A. R. Baboukani, A. Allagui, **A.A. Hachicha**, and C. Wang. On the mechanistic pathways of exfoliation-and-deposition of graphene by bipolar electrochemistry. *Nanotechnology*, 2021, In Press <https://doi.org/10.1088/1361-6528/ac037c>.
- Z. Said, **A.A. Hachicha**, S. Aberoumand, B.A. Yousef, E.T. Sayed, E. Bellos. Recent advances on nanofluids for low to medium temperature solar collectors: energy, exergy, economic analysis and environmental impact. *Progress in Energy and Combustion Science*, 2021, 84, 100898.
- B.A. Yousef, **A.A. Hachicha**, I. Rodriguez, M.A. Abdelkareem, A. Inyaat. Perspective on integration of concentrated solar power plants. *International Journal of Low-Carbon Technologies*, 2021, ctab034, <https://doi.org/10.1093/ijlct/ctab034>.
- Z. Said, A. Waqas, A.A. Hachicha, R. Loni. Central versus off-grid photovoltaic system, the optimum option for the domestic sector based on techno-economic-environmental assessment for United Arab Emirates. *Sustainable Energy Technologies and Assessments* 2021, 43, 100944.
- **A.A. Hachicha**, Z. Said, SMA. Rahman, E Al-Sarairah. On the thermal and thermodynamic analysis of parabolic trough collector technology using industrial-grade MWCNT based nanofluid. *Renewable Energy* 2020, 161, 1303-1317.
- SMA. Rahman, **A.A Hachicha**, C. Ghenai, R. Saidur, Z. Said. Performance and life cycle analysis of a novel portable solar thermoelectric refrigerator. *Case Studies in Thermal Engineering*, 2020, 19, 100599.
- A. Allagui, H. Alnaqbi, A.S. Elwakil, Z. Said, **A.A. Hachicha**, C. Wang, and M.A. Abdelkareem. Fractional-order electric double-layer capacitors with tunable low-frequency impedance phase angle and energy storage capabilities. *Applied Physics Letters* 2020, 116 (1), 013902.
- Z. Said, M. Ghodbane, **A.A Hachicha**, and B. Boumeddane. Performance assessment of linear Fresnel solar reflector using MWCNTs/DW nanofluids. *Renewable Energy* 2020, 151, 43-56.
- Z. Said, M. Ghodbane, **A.A Hachicha**, and B. Boumeddane. Optical performance assessment of a small experimental prototype of linear Fresnel reflector . *Case Studies in Thermal Engineering*, 2019, 16, 100541.
- **A.A Hachicha**, B.A.A Yousef, Z. Said, I. Rodríguez. A review study on the modeling of high-temperature solar thermal collector systems. *Renewable and Sustainable Energy Reviews* 2019, 112, 280-298.
- Z. Said, M. El Haj Assad, **A.A Hachicha**, E. Bellos, M. Ali. Abdelkareem, D. Zeyad, B. Yousef. Enhancing the performance of automotive radiators using nanofluids. *Renewable and Sustainable Energy Reviews*, 2019 112, 183-194.

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- M.A. Ehyaei, A. Ahmadi, M. El Haj Assad, **A.A. Hachicha**, Z. Said. Energy, exergy and economic analyses for the selection of working fluid and metal oxide nanofluids in a parabolic trough collector. *Solar Energy* 2019, 187, 175-184.
- **A.A. Hachicha**, I. Al-Sawafta, D. Ben Hamadou. Numerical and experimental investigations of dust effect on CSP performance under United Arab Emirates weather conditions. *Renewable Energy* 2019, 143, 263-276.
- **A.A.Hachicha**, I. Al-Sawafta, Z. Said. Impact of dust on the performance of solar photovoltaic (PV) systems under United Arab Emirates weather conditions. *Renewable Energy* 2019, 141, 287-297.
- E.W Bitam, Y. Demagh, **A. A. Hachicha**, H. Benmoussa, and Y. Kabar. Numerical investigation of a novel sinusoidal tube receiver for parabolic trough technology. *Applied Energy*, 218, 494-510, 2018.
- **A.A. Hachicha**, I. Rodríguez, and C. Ghenai. Thermo-hydraulic analysis and numerical simulation of a parabolic trough solar collector for direct steam generation. *Applied Energy*, 2018, vol. 214, p. 152-165.
- **A.A. Hachicha**. Thermo-hydraulic modelling for Direct Steam Generation. *Energy Procedia*, 143, 705-712, 2017.
- **A.A. Hachicha** and M. Tawalbeh. Design of a new concentrated photovoltaic system under UAE conditions. In *AIP Conference Proceedings* 2017, 1850, No. 1, p. 110004, AIP Publishing, 2017.
- C. Ghenai and **A.A. Hachicha**. Thermal Performance of Biomass-Fired Steam Power Plant. *Journal of Thermal Science and Engineering Applications ASME* 2107; 9; 3; 031002 .
- E. Al-Sarairah, C. Ghenai, and **A.A. Hachicha**. Multiplicity of premixed flames under the effect of heat loss. *Journal of Thermal Science and Engineering Applications ASME* 2107; 9; 3; 031001 .
- E. Al-Sarairah, B. Al-Hasanat, and **A.A. Hachicha**. On the stability of planar premixed flames under non adiabatic conditions and preferential diffusion. *Journal of Thermal Science and Engineering Applications ASME* 2107; 9; 3; 031010 .
- **A.A. Hachicha**. Numerical simulation of a parabolic trough solar collector for hot water and steam generation. *AIP Conference Proceedings*. Vol. 1734. No. 1. AIP Publishing, 2016.
- **A.A. Hachicha**, C.Ghenai, A-K Hamid, Enhancing the Performance of a Photovoltaic Module using Different Cooling Methods. *International Science Index, Energy and Power Engineering* Vol:9, No:9, 2015 waset.org/Publication/10002519.
- K. Thakkar, C. Ghenai, **A.A. Hachicha**. Integrated modeling approach for energy planning and climate change mitigation assessment in the state of Florida. *International Science Index, Energy and Power Engineering* Vol:9, No:9, 2015 waset.org/Publication/10002680.
- **A.A. Hachicha**, I. Rodríguez and A.Oliva. Wind speed effect on the flow field and heat transfer around a parabolic trough solar collector. *Applied Energy* 2014; 130, pp 200-211.
- **A.A. Hachicha**, I. Rodríguez, O. Lehmkuhl and A. Oliva. On the CFD and HT of the flow around a parabolic trough solar collector under real working conditions. *Energy Procedia* 2014; 49, pp 1397-1390.
- **A.A. Hachicha**, I. Rodríguez, R. Capdevila and A. Oliva. Heat transfer analysis and numerical simulation of a parabolic trough solar collector. *Applied Energy* 2013; 111: 582-592.
- **A.A. Hachicha**, I. Rodríguez, J. Castro and A. Oliva. Numerical simulation of wind flow around a parabolic trough solar collector. *Applied Energy* 2013; 107 , pp. 426-437.

Publications-Conferences

- **A.A. Hachicha**, B. Youssef, Z. Said. A review study on the modeling of high temperature solar thermal collector systems. In ICREGA2018, Sousse Tunisia 2018 (Accepted in ICREGA partner journal)
- Z. Said, M. El Haj Assad, **A.A. Hachicha**, E. Bellos, M.A. Abdelkareem, D. Alazaizeh, Ph.D, B. Yousef. Performance Enhancement of an Automotive Radiator Using Nanofluids. In ICREGA2018, Sousse Tunisia 2018 (Accepted in ICREGA partner journal)
- B. Youssef. **A.A. Hachicha**, Z. Said, M. Abid. A review study on the modeling of low temperature solar thermal collector systems. In ICREGA2018, Sousse Tunisia 2018.
- Y. Demagh and **A.A. Hachicha**. Key aspects of a novel undulated receiver for parabolic trough collectors. In Solar World congress Abu Dhabi 2017.
- **A.A. Hachicha**. Thermo-hydraulic modelling for Direct Steam Generation. In the World Engineers Summit – Applied Energy Symposium and Forum: Low Carbon Cities and Urban Energy Joint Conference, WES-CUE 2017, 19–21 July 2017, Singapore.
- **A.A. Hachicha** and M. Tawalbeh. Design and modeling of a novel integrated CSP membrane distillation desalination system. The Fifth International Conference on Water, Energy and Environment (ICWEE/5), Sharjah, UAE, February 28- March 2 ,2017.
- **A.A. Hachicha**. Numerical simulation of a parabolic trough solar collector for hot water and steam generation. In SolarPaces 2016 conference, Abu Dhabi.
- S.M.A.Rahman, S. Akhor, **A. Hachicha**, F. M. Alyassi, H. K. Alshamsi, A. M. Alowais. Smart Greenhouse for plantation in UAE climate. 9th International Conference on Sustainable Energy and Environmental Protection, Talas, Kayseri, Turkey, September 22-25, 2016.
- **A.A. Hachicha**. Numerical modelling of fluid flow and heat transfer around bluff bodies.9th International Conference on Thermal Engineering Abu Dhabi 2016.
- **A.A. Hachicha**. Fluid-structure interactions around a parabolic trough solar collector using Large Eddy Simulations. In Flucome conference, Doha 2015.
- **A.A.Hachicha**, I. Rodríguez, R. Capdevila and A. Oliva. Large-eddy simulations of fluid flow and heat transfer around a parabolic trough solar collector In Eurosun conference, Rijeka, Croatia 2012
- **A.A. Hachicha**, I. Rodríguez, O. Lehmkuhl and A. Oliva. On the CFD and HT of the flow around a parabolic trough solar collector under real working conditions In SolarPACES conference, Las Vegas, USA 2013.
- **A.A. Hachicha**, I. Rodríguez, R. Capdevila and A. Oliva. Numerical simulation of a parabolic trough solar collector considering the concentrated energy flux distribution In 30th ISES World congress, Kassel, Germany 2011, SWC 2011, (5), pp. 3976-3987.

Research Projects

○ Principal Investigator

- Competitive research project at the University of Sharjah: “Numerical and Experimental Investigations of Dust Effect on Solar Systems under United Arab Emirates Weather Conditions and Dust Mitigation Methods ” (80000 AED).
- Targeted research project at the University of Sharjah “Numerical and experimental study of an innovative solar absorber- parabolic trough collectors case” (200000 AED).
- External research project with collaboration of Sharjah Electricity and Water Authority: “Hybrid solar PV-thermal System” (95000 AED).
- Seed research project at the University of Sharjah: “Design, test and modelling of direct steam

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generation process using parabolic trough solar” (20000 AED).

○ **Co-PI**

- Targeted research project at the University of Sharjah “Performance enhancement of Parabolic trough solar collector with different inserts, design, and nanofluid” (200000 AED).
- Competitive research project at the University of Sharjah: “Demand Response and Renewable Energy integration in Institutional Buildings: A Case Study of a University of Sharjah Campus-UAE.” (80000 AED).
- External research project with collaboration from the Korea Aerospace University: “Study on renewable energy using a solar updraft tower and its effectiveness as an outdoor air purification system.” (95000 AED).
- External Research project with collaboration of Sharjah Electricity and Water Authority Solar: “Powered air conditioning system” (95000 AED).
- External Research project with collaboration of Sharjah Electricity and Water Authority: “Demand Side Management using Stand-Alone Hybrid Power Systems” (95000 AED).
- Competitive research project at the University of Sharjah: “3KW PV/T Hybrid System with Front and Back Cooling” (80000 AED).
- Competitive research project at the University of Sharjah: “Study on a novel approach of atmospheric freeze drying system using vortex tube” (80000 AED).
- REELCOOP EU/FP7 funded project: “Design of a 6 kW hybrid solar/biomass micro-cogeneration ORC system” at the National School of Engineering of Tunis.

Graduation projects supervised

- 2019-2020
 - Evaluation of an innovative PV thermal collector under UAE weather conditions.
 - Design and Test of Self-Cleaning Methods to Mitigate Dust Accumulation on Solar Systems.
 - Reducing PV Soiling and Condensation Using Hydrophobic Coating with Controllable Curtains.
- 2018-2019
 - Testing and Evaluation of a novel absorber tube for Parabolic Trough Solar Collector Technology.
 - Design of a concentrated solar PV and thermal system using Linear Fresnel Reflector.
 - Direct Steam Generation Using a High Flux Solar Collector.
- 2017-2018
 - Design and testing of a novel absorber tube for parabolic trough solar collector technology.
 - The Effect of Dust on Solar Systems and Dust Mitigation Methods.
 - Energy and Exergy efficiency of a photovoltaic thermal system (PVT) using industrial grade MWCNTs based nanofluids.
- 2016-2017
 - Design of hybrid system for green building solar decathlon study case.
 - Implementation of Concentrated solar power in solar absorption application.
 - Design and implementation of Direct Steam Generation System for parabolic trough collectors.
- 2015-2016
 - Integrated membrane distillation system using parabolic trough solar collector for water desalination application.
 - Design of a heat exchanger for thermal energy storage using phase change materials.
 - Design of a solar ice maker.
 - Design of a new inflated concentrated photovoltaic system under UAE conditions.

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- Modular, ballasted single-axis tracking system for Enerwhere's off-grid power rental business incorporating EDS technology.
- 2014-2015 ○ Design of a small prototype of parabolic trough solar collector for direct steam generation process.
- Green Farm: Applicable Renewable technologies.
- Stand-Alone Solar-Powered Hydrogen System for LED Street lights.
- 20 MW Solar Power Plant.
- Manufacturing and Testing of Dye Sensitized Solar Cells.

Teaching and Curriculum Development

- Teaching interests
 - Solar thermal energy systems (developing the content of this course at University of Sharjah).
 - Heat transfer.
 - Thermodynamics.
 - Fluid Mechanics.
 - Introduction to energy science and technology.
 - Numerical Methods.
 - Design for energy efficiency.
 - Solar PV systems.

- Teaching experience

- Spring 2020/21 406300 Heat transfer, 406420 Solar thermal energy systems.
 Fall 2020/21 406300 Heat transfer.
- Spring 2019/20 406320 Solar PV systems, 406420 Solar thermal energy systems.
 Fall 2019/20 406201 Fluid Mechanics.
- Spring 2018/19 406201 Fluid Mechanics, 406420 Solar thermal energy systems.
 Fall 2018/19 406201 Fluid Mechanics
- Spring 2017/18 406420 Solar thermal energy systems.
 Fall 2017/18 406100 Intro to Energy Science & Tech, 406300 Heat transfer.
- Spring 2016/17 406300 Heat transfer, 406420 Solar thermal energy systems.
 Fall 2016/17 406100 Intro to Energy Science & Tech, 406300 Heat transfer.
- Spring 2015/16 406201 Fluid Mechanics, 406420 Solar thermal energy systems.
 Fall 2015/16 406100 Intro to Energy Science & Tech, 406420 Solar thermal energy systems.
- Spring 2014/15 406100 Intro to Energy Science & Tech, 406422 PV technology and Manufacturing, 406420 Solar thermal energy systems.
 Fall 2014/15 406200 Thermodynamics.

Work Experience

- Sep2014- **Assistant Professor**, *Sustainable and Renewable Energy Engineering department*,
Present *College of Engineering*, University of Sharjah, United Arab Emirates.
Teaching: Thermodynamics, Fluid Mechanics, Heat Transfer, Introduction to energy sciences and technologies, Solar thermal energy systems, Solar PV systems, PV technology and Manufacturing, Heat transfer lab, Fluid Mechanics lab Solar PV systems lab.
Supervising and research work on renewable energy systems.
Teaching and learning committee chair, Undergraduate accreditation committee chair and participation in ABET and MOHESR accreditation preparation.
- Feb2014- **Postdoctoral position / Assistant researcher**, *National School of Engineering*
Aug2014 *of Tunis, ENIT*, Tunisia.
Teaching heat transfer and numerical methods for mechanical and industrial engineering students. Postdoctoral fellow in the research project REELCOOP for installing a 60 kW parabolic trough solar plant at ENIT. Modelling and simulation of parabolic trough solar collector for direct steam generation DSG.
- Nov2012- **Consultant** , *NurEnergie*, United Kingdom.
Mar2013 Supporting the new solar plant project TuNur in the desert of Tunisia. Preparing technical description and technological solutions for the TuNur project
- Feb2007- **Maintenance assistant**, *Valeo* , *EZZAHRA STC*, Tunisia.
Nov2007 Development and setting of a new Computerized Management of Maintenance System CMSS and involving indifferent problems of maintenance department.
- Aug2006- **Summer training** , *IT-Government* , Tunisia.
Sep2006 Development of a new software for management of an accountant office with Windev 10.
- Mar2006- **Engineering training**, *BG « British Gas »* , Tunisia.
Apr2006 Setting of a level transmitter and development of a new data base « Cause and effect ».
- July2005- **Worker training** , *SOCOMENIN* , Tunisia.
Aug2005 Analysis of unrolling of the project: great made men river of Libya

Services and Public Outreach

- Guest Editor. *Frontiers in energy research*. Research topic: *New Enhancement Techniques for Solar Thermal Collectors*.
- Peer reviewing for:
 - Applied energy journal.
 - Applied thermal engineering.
 - Energy conversion and management.
 - Renewable and Sustainable Energy Reviews.
 - Journal of solar energy engineering journal –ASME.
 - Energies.
- 2015 Talk on “Numerical Modeling of Fluid Flow and Heat Transfer around bluff bodies”, University of Sharjah , UAE.
- 2016 Judging in think science competition 2016
- 2017 Participation in the ABET accreditation process and preparation of the self-study report for SREE department.
- 2018 Participation in Know House team representing the University of Sharjah in Solar Decathlon 2018 competition.
- 2018 Organizing a Workshop on PV syst software titled “Design and simulation of a PV system using PV syst software ”, University of Sharjah, UAE.
- 2018 Judging in think science competition 2018.
- 2019 Participation in the industry event and the seminar “SREE Research activities and collaborations toward the new strategy (2019-2024)”.
- 2019 Participation in Master Engineering Accreditation committee to prepare self-study report for new master program.
- 2019 SREE representative in college Accreditation committee and reviewing CAA report.
- 2019 Member of Energy and climate change sustainability circle at UOS.
- 2019 Evaluator in think science competition 2019.
- 2019 Member of Organizational Committee of SREE International Conference (SEEP2019).
- 2019 Evaluator and judging panel in Explore Mars competition organized by Mohamed Ben Rashid Space Center.
- 2020 Talk on “Concentrated solar power technologies”, Sharjah Museum , UAE.
- 2020 Reviewing and update SREE accreditation documents. Reviewing the CAA report after the last visit and prepare the responses for the requirements and suggestions of the external review team.
- 2020 College representative in the Academic Curriculum Sustainability Circle to prepare the university submission in STARS (Sustainability Tracking, Assessment & Rating System).

Computer skills

Operating Systems | Windows| MS-DOS|Linux.

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Programming Languages C,C++,Pascal, Maple, Matlab, Visual Basic, Windev10, Python.
DataBase management system Access| Oracle | MySQL.
Applications MS-Office, LINDO, PSPICE, AUTOCAD, Pérlude, AMC Designer, MFG-PRO, SLAM, Tecplot, Paraview, ANSYS ICEM CFD, Gambit, Fluent, Comsol, TRNSYS, Epsilon, PVSyst, HOMER, CES Edupack.

Languages

Arabic **Mother tongue**
English **Fluent**
French **Fluent**
Spanish **Fluent**

Interests

- Experiences abroad: lived in Spain for more than 5 years and travelled independently in Europe
- Chess: competed and awarded throughout Tunisia, Spain and UAE in various tournaments