


Dossier of
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BAHAIDARAH



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King Fahd University of Petroleum & Minerals
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Submitted for promotion to the rank of
Professor

Submitted in September 2016

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Appendix :

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1.0 RESUME

1.1 Personal Data

1.2 Summary of Teaching and Research Activities

1.3 Education

1.4 Employment History

1.5 IT Expertise

1.6 Awards and Scholarships

1.7 Annual Evaluations at KFUPM

1.0 RESUME

DR. Haitham M. Bahaidarah

1.1 Personal Data

Date of Birth : January 4, 1974.
Marital Status : Married, Three (4) children.
Languages : English and Arabic.
Address : P. O. Box 84, Dhahran 31261, Saudi Arabia.
Telephone : (013) 860-1747 (Office).
Fax : (013) 860-2949
Email : haithamb@kfupm.edu.sa

1.2 Summary of Teaching and Research Activities

1.2.1 Courses Taught

Undergraduate Level.

- ME 203 Thermodynamic I
- ME 204 Thermodynamic II
- ME 311 Fluid Mechanics •
- ME 315 Heat Transfer
- ME 316 Thermo-Fluid Lab

Graduate and Senior Level.

- ME 411-412 Senior Design Project
- ME 415 Applied Senior Design Project
- ME 439 Solar Energy Conversions.
- ME 501/ MATH 574 Numerical
Methods of Partial Differential
Equations.
- ME 539 Solar Energy Utilizations.

1.2.2 Courses Coordinated

- ME 204 Thermodynamic II.
- ME 315 Heat Transfer.
- ME 351 Applied Mechanical Eng. Coop. (Coordinator)
- ME 399 Summer Training Program (Coordinator)

1.2.3 Research Interests

- Thermal Sciences with particular interest on

- Solar Energy
- Renewable Energy
- Heat Transfer Enhancement
- Computational Fluid Dynamics
- Numerical and computational methods for partial differential equations

1.3 Education

1999-2004 Doctor of Philosophy (Ph.D.)

Subject Mechanical Engineering.
 From: Texas A&M University.
 Area of specialization: Heat Exchangers.
 Supervisor: Prof. N. K. Anand
 Thesis title: A Numerical Study Of Heat And Momentum Transfer Over A Bank Of Flat Tubes

1996-1999 Master of Science (M.S.)

Subject Mechanical Engineering.
 From: KFUPM, Dhahran, Saudi Arabia
 Area of specialization: Thermal Sciences
 Supervisor: Prof. Syed M. Zubair
 Cumulative GPA: 3.8/4.0
 Thesis title: Design and Performance Evaluation of Evaporative Cooling Towers.

1990-1996 Bachelor of Engineering Science (B.S.)

Subject Mechanical Engineering.
 From: KFUPM, Dhahran, Saudi Arabia
 Area of specialization: Thermal Sciences
 Academic Advisor: Prof. P. Gandhidasan
 Cumulative GPA: 3.15/4.0

1.4 Employment History

June 2010 - present Associate Professor, Department of Mechanical Engineering, King Fahd University of Petroleum & Minerals (KFUPM), Dhahran 31261, Saudi Arabia

October 2004 – June 2010 Assistant Professor, Department of Mechanical Engineering, King Fahd University of Petroleum & Minerals (KFUPM), Dhahran 31261, Saudi Arabia.

July 1999 – September 2004 Lecturer, Department of Mechanical Engineering, King Fahd University of Petroleum & Minerals (KFUPM), Dhahran 31261,

Saudi Arabia.

January 1996 - July 1999 **Graduate Assistant**, Department of Mechanical Engineering, King Fahd University of Petroleum & Minerals (KFUPM), Dhahran 31261, Saudi Arabia.

1.5 IT Expertise

- **Languages:** HTML, LaTeX, FORTRAN
- **Systems:** UNIX, Microsoft Windows
- **Mathematical Packages:** Matlab, Maple, Mathematica, MathCad
- **Simulation Packages:** Solid Works, Lab View, StarCD, PHOENICS, FLUENT, GAMBIT, Magma
- **Others:** WebCT, Authorware

1.6 Awards and Honours

- Distinguished Services Award (20 years) by the Rector of the University, May 2016.
- The DSR-RG project was awarded the Unilever prize award for best scientific Research Energy at Jeddah, May 2016. I was the Co-advisor of the graduate student Research Project at KFUPM entitled "Investigation of a Solar-Assisted Thermally Activated Air Conditioning System," by Muhammad Mujahid Rafique (ID#201303750).
- The KACST project presentation was awarded the 3rd prize award for best scientific presentation (graduate category) in 6th Saudi Students Conference sponsored by Ministry of Education at Jeddah March 2015. I was the advisor of the graduate student Research Project at KFUPM entitled "Experimental Performance Evaluation of Uniform Cooling Technique for Photovoltaic Panels," by Ahmer Ali Baloch, (ID#201202120).
- Certificate of Recognition by the Summer Program Director for Distinguished Services to the University as Mechanical Engineering summer coordinator for summer of 2014/2015.
- Certificate of Recognition by the Vice Rector of Research for Distinguished Services to the University as Director of Center of Research Excellence in Renewable Energy (CoRE-RE) 2014.
- Certificate of Recognition by Saudi Aramco for effective participation and the successful contribution towards 2013 Energy Conservation Forum.
- Certificate of Recognition by the Center Director of KFUPM-MIT collaborations in Clean Water and Clean Energy Research Workshop, March 2010.

- Certificate of Recognition by the Dean of Engineering Science for serving in the Publicity committee of Second Saudi Engineering Forum 28-30 March 2009.
- Certificate of Recognition by the Dean of Academic Development for Distinguished Services in Evaluating Innovative Ideas 2008/2009.
- Certificate of Recognition by the Dean of Faculty and Staff Affairs Distinguished Services to the University Standing Faculty Affairs Committees (FAC) 2008/2009.
- Certificate of Recognition by the Dean of Scientific Research for serving in the University Research Committee 2007/2008.
- Certificate of Recognition by ME Dep. Chairman for Distinguished Performance in directing the Computer lab and Heat Transfer Lab 2007/2008.
- Plaque and Certificate of Recognition by SABIC for Distinguished Performance in preparation of a program for one full week for SABIC's new students with international scholarships. 2006, 2007 and 2008.
- Certificate of Recognition by the Vice Rector of Academic Affairs for Distinguished Services to the University-SABIC program August 2007.
- Certificate of Recognition by King Abdulaziz & his Companions Foundation for the Giftedness and Creativity for Distinguished Performance in Participation of "The Summer Gifted Student Program", 2-4 April 2007.
- Certificate of Recognition by the Dean of Student Affairs for Distinguished Performance in the student activities for organizing of the 20th visit for GCC students 18-22 Nov. 2006.
- Distinguished Services Award (10 years) by the Rector of the University, May 2006.
- The Award of best Undergraduate Research Grant Competition at KFUPM, and won the First Position in 2005. I was the advisor of the Undergraduate Research Project in the Gifted Student Program at KFUPM 2005 entitled "Sea Wave Energy Machine," by Mustafa Al-Huwaider, (ID#225250).
- Certificate of Recognition by ME Dep. Chairman for Distinguished Performance in the ME student activities 2005/2006.

1.7 Annual Evaluations at KFUPM

2004-2005	DISTINGUISHED
2005-2006	DISTINGUISHED
2006-2007	EXCELLENT
2007-2008	EXCELLENT
2008-2009	Pending with Sub-Committee
2009-2010	N/A
2010-2011	EXCELLENT
2011-2012	DISTINGUISHED
2012-2013	EXCELLENT
2013-2014	Pending with Chairman
2014-2015	Pending with Chairman

Copy of letters from Dean, Faculty & Personnel Affairs, KFUPM, is attached in **Appendix B.**

2.0 TEACHING

2.1 Courses Taught and Course Evaluations

2.2 Advising and Course Coordination

2.3 Program and Course Development Responsibilities

2.4 Participation in Workshops and Short Courses

2.0 TEACHING

2.1 Courses Taught and Course Evaluations

2.1.1 Courses Taught at KFUPM, Dhahran, Saudi Arabia.

The list of courses taught at KFUPM and the corresponding student evaluations on a scale of 10 are given below:

Semester	Course Number- Title	Student Evaluation/10
041	ME 316-04 Thermo-Fluid Laboratory	9.61
042	ME 203-08 Thermodynamics I ME 203-12 Thermodynamics I	8.52 8.62
051	ME 203-03 Thermodynamics I ME 203-04 Thermodynamics I	7.69 8.58
052	ME 204-04 Thermodynamics II ME 204-05 Thermodynamics II	8.41 8.21
061	ME 204-04 Thermodynamics II ME 204-05 Thermodynamics II PYP 003-22 University Study Skills	9.03 8.65 8.48
062	ME 311-01 Fluid Mechanics ME 311-02 Fluid Mechanics PYP 003-22 University Study Skills	8.37 8.59 8.71
071	ME 311-01 Fluid Mechanics ME 351-01 AME Coop Program	8.40 N/A
072	ME 315-01 Heat Transfer ME 315-04 Heat Transfer ME 351-01 AME Coop Program	8.03 7.85 N/A

073	ME 399-01 Summer Training Program ME 351-01 AME Coop Program	N/A N/A
081	ME 315-01 Heat Transfer ME 315-03 Heat Transfer ME 351-01 AME Coop Program	8.8 8.3 N/A
082	ME 501-01 Numerical Methods of PDEs ME 351-01 AME Coop Program	7.97 N/A
091	ME 204-05 Thermodynamics II ME 351-01 AME Coop Program	9.16 N/A
092	ME 439 Solar Energy Conversion	8.59
101	ME 539 Solar Energy Utilization	6.64
112	ME 439 Solar Energy Conversion	8.44
122	ME 439 Solar Energy Conversion	8.11
132	ME 204-02 Thermodynamics II	8.75
141	ME 204-01 Thermodynamics II ME 204-02 Thermodynamics II	8.12 8.88
142	ME 204-01 Thermodynamics II ME 204-02 Thermodynamics II	9.18 8.69
151	ME 204-01 Thermodynamics II ME 204-02 Thermodynamics II	8.02 9.14
152	ME 204-01 Thermodynamics II ME 204-02 Thermodynamics II	7.45 8.75

2.2 Advising and Course Coordination

2.2.1 Advising and Supervision

- As Academic Advisor to students enrolled in the undergraduate programs of the Department of Mechanical Engineering, KFUPM, I am involved with advising students in their academic affairs.
- Supervised the following senior design projects in KFUPM since join on 2004:
 - 015-052: Air-cooled finned tube heat exchangers. (3 Students)
 - 061-062: Numerical Calculation of Temperature Distribution of a Plate with Electronic Chip. (4 Students)
 - 071-072: Testing of Thermal Cup Holder. (2 Students)
 - 081-082: Design and Performance Evaluation of Solar Powered Data Dryer. (5 Students)
 - 091-092: Testing of a Solar Dryer Suitable for Grapes. (3 Students)
 - 101-102: Modeling of a Low Concentrating Photovoltaic System. (3 Students)
 - 111-112: Designing and Testing of a Low Concentrating Photovoltaic System. (3 Students)
 - 121-122: Uniform Cooling of Photovoltaic Solar Cells. (3 Students)
 - 131-132: Design, fabrication and testing of a PV panel with uniform cooling. (4 Students)
 - 141-142: Testing of PV-CPC systems with different configurations. (3 Students)
 - 151-152: Design and testing of a hybrid solar cooker. (4 Students)
- Supervised the following coop student in KFUPM since join on 2004:
 - (042-043-051): Ahmed Al-Faqih, Saudi ARAMCO Jeddah refinery.
 - (043-051-052): Nezar Himdy, SABIC Kemya Jubail.
 - (052-053-061): Mohammad Bashabain, United Carton Industries Company
 - (062-063-071): Khalid Al-Harbi, Saudi Aramco Mobil Refinery(SAMREF)
 - (063-071-072): Ahmad Al-Owaiyed, Schneider Electric Riyadh.
 - (2008 - 2010): I was the COOP Coordinator for 3 years in ME Dep.
 - (102-103-111): Ali Al-Salem, Ras Tanurah Refinery.
 - (103-111-112): Hassan Al-Hashem, Saudi Aramco Jeddah Refinery.
 - (103-111-112): Mansour Battati, Johnson Control Co.
 - (112-113-121): Ali AlKhathami, Saudi Aramco.
 - (113-121-122): Nasser Al-Dossari, Al Khodari Sons Co.
 - (113-121-122): Mohammed Al-Jaroudi, Johnson Control Co.
 - (113-121-122): Mohammad Al-Omrani, Saudi Electricity Company.
 - (122-123-131): Jassim Al Mubarak, Saudi Electricity Company.
 - (123-131-132): Abdullah Al-Arfaj, Saudi ARAMCO R&D Center.
 - (123-131-132): Abdul-Aziz Al-Jaman, Saudi Kayan.
 - (132-133-141): Hassan Al-Alwah, Saudi Electricity Company.
 - (132-133-141): Hassan Al-Ghamdi, Tasnee.
 - (133-141-142): Adnan Al-Tuwaileb, Saudi ARAMCO Abqaiq plant.
 - (133-141-142): Ali Al-Mesbah, Flowserve.

- (142-143-151): Sultan Al-Shehri, Saudi Aerospace Engineering Industries.
- (143-151-152): Abdullah Al-Qahtani, Al-Qahtani Pipe Coating Industries.
- (143-151-152): Mohamed Al-Mulhem, AREVA France.
- (152-153-161): Hesham Al-Dahmash, Saudi Electricity Company.

2.2.2 Course Coordination

▪ Coordination

Semester	Course Number- Title	Sections	Approx. Number of Students Enrolled
072	ME 315 Heat Transfer	05	110
081	ME 315 Heat Transfer	05	100
141	ME 204 Thermodynamics II	06	140
142	ME 204 Thermodynamics II	05	120
152	ME 204 Thermodynamics II	06	140

2.3 Program and Course Development Responsibilities

- I was the **COOP Coordinator** of the Applied Mechanical Engineering Program for three years. Due to the high number of repeated questions about the policy and required regulations, I have prepared guide lines of the AME coop program.
- I was a project member of team involved in **incorporating Design** at all level in Mechanical Engineering Academic program.
- As a member of “the ME **New Curriculum** Program Development Committee” in the year 2008-2009, my contribution in the development as requested is to provide a written statement about any issues related to COOP which could be discussed and taken care of when developing this program without violating the governing KFUPM Constraints. The proposal contained complete design of the BS program with details about the structure of the courses and the contents of the courses.
- I was a member of “**Graduate Program and Admission Committee**” in the year 2014-2015. The committee were assigned to develop a comprehensive revision of the graduate program. The study contained complete revision of the MS and MES program with details about the structure of the courses and including PhD comprehensive exam regulations.
- Developing an online course in the area of solar energy (On-Line Course ME 439). This

work was about the development of ME 439: Solar Energy Conversion as an online course. ME 439 is an elective course in the thermal sciences area offered by the Mechanical Engineering Department at KFUPM. The course content includes solar radiation measurement and prediction, selected topics in heat transfer, flat plate and focusing collector analysis, solar energy storage, solar systems including hot water, space heating and cooling, distillation and thermal power conversion. ME 439 being available online will provide an interactive, convenient, self-paced course in Solar Energy for a wider cross-section of the learning society. Approximately 25-30 students register every year for the in-class teaching course.

- I have been assigned a committee chairman by the ME Department Head to develop a proposal for an elective course about “Introduction to Sustainable Energy” to be offered next academic year. The detailed proposal highlighted the need for this course, its objectives, course outline and other details.
- Computer Lab Director: I was appointed as a Director of ME Computer Lab in 2007/2008. I have contributed significantly in running the lab smoothly. Lab is being used for graduate research, term paper projects, senior design projects and other course related activities
- Heat Transfer Lab Director: I was appointed as a Director of ME Heat Transfer Lab in 2008/2009. I have contributed significantly in running the lab smoothly. Lab is being used for graduate research, term paper projects, senior design projects and other course related activities.

2.4 Participation in Workshops and Short Courses

Date	Course Title	Number of participants	Course/ Instructor Evaluation/4
24 Dec. – 28 Dec. 2005	Computational Fluid Dynamics and Heat Transfer for Industrial Applications Course Coordinator: Dr. Ben-Mansoor	8	2.71/3.08
22 Apr. – 26 Apr. 2006	Computational Fluid Dynamics and Heat Transfer for Industrial Applications Course Coordinator: Dr. Ben-Mansoor	2	3.75/3.83
25 Nov. 2006	Computational Fluid Dynamics and Heat Transfer for Industrial Applications Course Coordinator: Dr. Ben-Mansoor	4	Not available

01 Mar. – 12 Mar. 2008	PCI 104–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	22	2.6/3.57
31 May – 11 June 2008	PCI 104–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	16	2.42/3.68
24 Jan. – 04 Feb. 2009	PCI 104–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	21	2.74/3.72 <i>highest</i>
31 Oct. – 11 Nov. 2009	PCI 104–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	25	2.86/3.60 <i>highest</i>
05 June – 16 June 2010	PCI 104–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	21	2.46/3.59 <i>highest</i>
01 Oct. – 12 Oct. 2011	PCI 104–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	13	2.83/3.65
11 Feb. – 22 Feb. 2012	PCI 302–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	15	2.00/3.51 <i>highest</i>
07 April – 18 April 2012	PCI 302–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	17	2.73/3.53 <i>highest</i>
09 Feb. – 20 Feb. 2013	PCI 301–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	23	2.18/3.56 <i>highest</i>
18 May – 29 May 2014	PCI 301–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	20	2.63/3.40 <i>highest</i>
17 May – 28 May 2015	PCI 301–ARAMCO Closed Course Process Design for Instrument Engineer Course Coordinator: Dr. Syed Zubair	18	2.43/3.10 <i>highest</i>

3.0 RESEARCH

3.1 List of Publications

3.2 Technical Reports

3.3 Funded Research Projects at KFUPM

3.4 Conference and Seminar Presentations

3.5 Conference and Workshops Attended

3.6 Supervision

3.7 Citations Received by Others

3.8 Contribution in Each Joint-Authored Journal Paper

3.9 Seven (7) Publications Considered as Main
Contribution

3.0 RESEARCH

3.1 List of Publications

3.1.1 Papers in Internationally Recognized Refereed Journals

Papers extracted from Ph.D. Thesis

- J01** [Haitham M.S. Bahaidarah](#), N.K. Anand, and H.C. Chen "Numerical Study of Fluid Flow and Heat Transfer Over a Bank of Flat Tubes" Numerical Heat Transfer Part-A, Volume 48, no. 4/01, September 2005 pp. 359-385.

Papers not extracted from Ph.D. Thesis (*Considered for promotion to the rank of Associate Professor*)

- J02** [Haitham M.S. Bahaidarah](#), N.K. Anand, and H.C. Chen "A Numerical Study of Heat and Momentum Transfer in Channels with Wavy Walls" Numerical Heat Transfer Part-A, Volume 47, no. 5, March 2005 pp. 417-439.
- J03** [Haitham M.S. Bahaidarah](#), M. Ijaz, and N.K. Anand, "Numerical Study of Fluid Flow and Heat Transfer over a Series of In-Line Non-Circular Tubes Confined in a Parallel Plate Channel" Numerical Heat Transfer Part-B, Volume 50, Number 2 / August 2006 pp.97 – 119.
- J04** [Haitham M.S. Bahaidarah](#), "A Numerical Study of Fluid Flow and Heat Transfer Characteristics in Channels with Staggered Wavy Walls" Numerical Heat Transfer Part-A, Volume 51, Number 9 / June 2007 pp.877 – 898.
- J05** [Haitham M.S. Bahaidarah](#), "Fluid Flow and Heat Transfer Characteristics in Sharp Edge Wavy Channels with Horizontal Pitch" the Emirates Journal for Engineering Research (EJER) 14 (1), 53-63 (2009).

Papers not extracted from Ph.D. Thesis (*Published after promotion to the rank of Associate Professor*)

- J06** [Haitham M.S. Bahaidarah](#), and Ahmet Z. Sahin "Thermodynamic Analysis of Fluid Flow in Channels with Wavy Sinusoidal Walls" Thermal Science, Year 2013, Vol. 17, No. 3, pp. 813-822.
- J07** [Haitham M.S. Bahaidarah](#), Abdul Subhan, P. Gandhidasan, and Shafiqur Rehman" Performance evaluation of a PV (photovoltaic) module by back surface water cooling for hot climatic conditions " Energy, 59 (2013) pp. 445-453.

- J08** Najam ul Qadir, Syed A. M. Said and **Haitham M. Bahaidarah**, “Structural Stability of Metal Organic Frameworks in Aqueous Media – Controlling Factors and Methods to Improve Hydrostability and Hydrothermal Cyclic Stability” Microporous and Mesoporous Materials, 201 (2015) pp. 61-90.
- J09** **Haitham M. Bahaidarah**, Bilal Tanweer, P Ghandidasan, Nasiru Ibrahim, Shafiqur Rehman, "Experimental and Numerical Study on Non-concentrating and Symmetric Unglazed Compound Parabolic Photovoltaic Concentration Systems" Applied Energy 2014, pp. 527-536.
- J10** M. K. Hossain, Q. A. Drmosh, A. M. Wajeh, and **Haitham M.S. Bahaidarah**, "Silver nanoparticles on conducting electrode: A simple two-steps process for realizing plasmonic solar cell design " , Applied Physics A : Materials Science and Processing, 27 Aug. 2014.
- J11** **Haitham M. Bahaidarah**, B. Tanweer, P. Gandhidasan, and S. Rehman, “A combined optical, thermal and electrical performance study of V-trough PV system – Experimental and analytical investigations” MDPI – Energies, 2015, 8, pp. 2803-2827.
- J12** Ahmer A.B. Baloch; **Haitham M. Bahaidarah**; P. Gandhidasan; and Fahad A. Al-Sulaiman., Experimental and numerical performance analysis of a converging channel heat exchanger for PV cooling., Energy Conversion and Management 103 (2015) 14–27.
- J13** **Haitham M. Bahaidarah**, Shafiqur Rehman, Abdul Subhan, P. Gandhidasan, and Hasan Baig "PV module performance for the climatic conditions in Dhahran" Energy Exploration & Exploitation, Volume 33, Number 6, 2015 pp. 909–930.
- J14** Muhammad Mujahid Rafique, P. Gandhidasan, and **Haitham M. Bahaidarah**, "Liquid desiccant materials and dehumidifiers-A review" Renewable & Sustainable Energy Reviews, 56 (2016), pp. 179–195.
- J15** **Haitham M. Bahaidarah**, Ahmer A.B. Baloch, and P. Gandhidasan, "Uniform cooling of photovoltaic panels: A review" Renewable & Sustainable Energy Reviews, 57 (2016), pp. 1520–1544.
- J16** **Haitham M. Bahaidarah**, “Experimental performance evaluation and modeling of jet impingement cooling for thermal management of photovoltaics " Solar Energy, Volume 135, October 2016, Pages 605–617.
- J17** **Haitham M. Bahaidarah**, “Entropy Generation during Fluid Flow in Sharp Edge Wavy Channels with Horizontal Pitch" Advances in Mechanical Engineering, 2016, Vol. 8(7) 1–10.
- J18** Amir Al-Ahmed, **Haitham M. Bahaidarah** and Mohammad A. Jafar Mazumder. “Biomedical perspectives of Polyaniline Based Biosensors”. Advanced Materials Research Vol. 810 (2013) pp 173-216. © (2013) Trans Tech Publications, Switzerland.

- J19** **Haitham M. Bahaidarah**, Ahmer A.B. Baloch, and P. Gandhidasan, B. Tanweer, Muzafferuddin Mahmood " A comparative study on the effect of glazing and cooling for compound parabolic concentrator PV systems - experimental and analytical investigations" Energy Conversion and Management, 129 (2016) 227–239.

3.1.2 Papers Under Review for Publication in Refereed Journals

- J20** Nasiru Ibrahim, **Haitham M. Bahaidarah**, and P Ghandidasan, Performance Analysis of a Closed-type Solar Regenerator for Liquid Desiccant Cooling Systems” International Journal of Green Energy, Under Review.
- J21** Muhammad Mujahid Rafique, P. Gandhidasan, and **Haitham M. Bahaidarah** "Rotary Type Liquid Desiccant Dehumidifier - A Feasibility and Parametric Analysis" Energy and Buildings, Under Review.

3.1.3 Papers Published in Proceedings of International Conferences

Papers not extracted from Ph.D. Thesis (*Considered for promotion to the rank of Associate Professor*)

- C01** **Haitham M.S. Bahaidarah**, N.K. Anand, and H.C. Chen "Flow and Heat Transfer over a series of In-Line Cylinders Confined in a Channel". 41st Annual Technical Meeting of the Society of Engineering Sciences, Lincoln, NE October10-13, 2004.
- C02** **Haitham M.S. Bahaidarah**, O. Duffuaa, and N.K. Anand, "Fluid Flow and Heat Transfer in Wavy Channels with Converging-Diverging Sharp Edge" Fifth International Conference on Computational Heat and Mass Transfer, Canmore, Calgary, Alberta, Canada, June 18-22, 2007.
- C03** **Haitham M.S. Bahaidarah**, Islam A.A.Shabaneh "Fluid Flow And Heat Transfer In Wavy Channels With And Without Baffles". First International Conference on Computational Methods for Thermal Problems Thermacomp 2009, September, 8-10, 2009, Naples, Italy.

Papers not extracted from Ph.D. Thesis (*Published after promotion to the rank of Associate Professor*)

- C04** Necar Merah, Maria C. Yang, David R. Wallace, Warren P. Seering, Victor Tang, Abul Fazal Arif, Abdel-Salam Eleiche, Abdel-Rahman Shuaib, Numan Abu-Dheir, and **Haitham M.S. Bahaidarah**, "A Global Collaborative Effort to Enhance Design in a Mechanical Engineering Curriculum in Saudi Arabia" Proceedings of the 2010 ASME IDETC, International Design Engineering Technical Conferences & Information in Engineering Conference, Montreal, Canada, August 15 – 18, 2010.

- C05** **Haitham M.S. Bahaidarah**, Shafiqur Rehman, P. Gandhidasan, and Bilal Tanweer "Experimental Evaluation of the Performance of a Photovoltaic Panel with Water Cooling" 39th IEEE Photovoltaic Specialists Conference, Tampa Bay, Florida, USA, June 16-21, 2013.
- C06** **Haitham M.S. Bahaidarah**, Bilal Tanweer and P. Gandhidasan, "Performance analysis of a low concentrating PV-CPC system" 39th IEEE Photovoltaic Specialists Conference, Tampa Bay, Florida, USA, June 16-21, 2013.
- C07** Hasan Baig, Nazmi Sellami, **Haitham M.S. Bahaidarah**, and Tapas Mallick, "Optical Analysis of a CPC based CPV/T System for application in the Kingdom of Saudi Arabia" 28th European Photovoltaic Solar Energy Conference (EU-PVSEC) 2013, Paris, France , 30 September-4 October 2013.
- C08** M. K. Hossain, Q. A. Drmosh, A. M. Wajeh, and **Haitham M.S. Bahaidarah**, "Silver nanoparticles on conducting electrode: A simple two-steps process for realizing plasmonic solar cell design" Meta'14 the 5th International Conference on Metamaterials, Photonic Crystals and Plasmonics., Singapore, 20 - 23 May, 2014, pp. 469-471.
- C09** **Haitham M.S. Bahaidarah**, Ahmer A.B. Baloch and P. Gandhidasan, "Modeling and Comparative Analysis of Jet Impingement Cooling and Conventional Channel Cooling for Photovoltaic Strings" 40th IEEE Photovoltaic Specialists Conference, Denver, Colorado, USA, June 8-13, 2014.
- C10** Ahmer A.B. Baloch, and **Haitham M.S. Bahaidarah**, Experimental Performance Evaluation of Uniform Cooling Technique for Photovoltaic Panels, 6th Saudi Studeny Conference, Jeddah 31 March -2 April 2015.
- C11** **Haitham M.S. Bahaidarah**., Experimental Performance Investigation of Uniform and Non-uniform Cooling Techniques for Photovoltaic Systems., 42nd IEEE Photovoltaic Specialists Conference, New Orleans, Louisiana, USA, June 14-19, 2015.
- C12** Ahmer A.B. Baloch, **Haitham M.S. Bahaidarah**, and Gandhidasan., An Experimental Study of the Effect of Converging Channel Heat Exchanger on PV System., 42nd IEEE Photovoltaic Specialists Conference, New Orleans, Louisiana, USA, June 14-19, 2015.
- C13** Hasan Md Zahir and **Haitham M.S. Bahaidarah**, "GDC electrolytes with patchwork type morphology and their microtubular SOFC applications" ASME Power & Energy 2015: Energy Solutions for a Sustainable Future), San Diego, USA, on 28 June – 02 July, 2015.
- C14** Ahmer A.B. Baloch, and **Haitham M.S. Bahaidarah**, Thermo-economic feasibility study of Converging Channel Heat Exchanger for PV System installed in Dhahran., EU PVSEC 2015 European Photovoltaic Solar Energy Conference and Exhibition, Hamburg, Germany, September 14 - 18, 2015.

- C15** **Haitham M.S. Bahaidarah.**, Energy and economic analysis of Uniform and Non-Uniform Cooling Methods for PV panels by experimental setup., EU PVSEC 2015 European Photovoltaic Solar Energy Conference and Exhibition, Hamburg, Germany, September 14 - 18, 2015.
- C16** Ahmer A.B. Baloch, **Haitham M.S. Bahaidarah**, and Gandhidasan., Computational Fluid Dynamics Study for the Optimization of Surface Temperature Profile of Photovoltaic/Thermal System., 43rd IEEE Photovoltaic Specialists Conference, Portland, Oregon, USA, June 05-10, 2016.
- C17** **Haitham M.S. Bahaidarah**, Gandhidasan, and Muzafferuddin Mahmood ., Performance Evaluation of Six Configurations of a Photovoltaic (PV) String with an Integrated Non-Imaging Concentrator and Water Cooling System., 43rd IEEE Photovoltaic Specialists Conference, Portland, Oregon, USA, June 05-10, 2016.

3.1.4 Book Chapter and Book Edited

Book Chapter

- BC01** Muhammad Mujahid Rafique, P. Gandhidasan, and **Haitham M. Bahaidarah** “Emerging Energy Efficient Thermally Driven HVAC Technology: Liquid Desiccant Enhanced Evaporative Air Conditioning” Springer. To be published soon.
- BC02** Muhammad Mujahid Rafique, P. Gandhidasan, Nasiru Ibrahim, and **Haitham M. Bahaidarah** “Recent developments in liquid desiccant cooling.” Elsevier. To be published soon.

Book Edited

- BE01** Amir Al-Ahmed, Mohammad Kamal Hossain, Mohammad Afzaal, and **Haitham M. Bahaidarah**. “Recent Advances in Renewable Energy Research”. Advanced Materials Research Vol. 1116. © (2015) Trans Tech Publications, Switzerland.

3.1.5 Patents

- P01** Md. Hasan Zahir and **Haitham Bahaidarah** “Natural patchwork type morphology fabrication by nanoporous grain boundary and their application for solar energy storage”. Patent Application Publication # US 2015/0206999 A1, July 23, 2015.
- P02** Mohamed Ali Mahmoud, Palanichamy Gandhidasan, Syed M. Zubair, and **Haitham Bahaidarah** “Thermodynamic Balancing in a Liquid Desiccant Cooling System by Extraction Technology”. Patent Filed 2016

- P03** Farooq Saeed, Mohammad Ibrahim Khalil Iraqi, and **Haitham Bahaidarah** “Thermodynamic Balancing in a Liquid Desiccant Cooling System by Extraction Technology. An Autonomous Mechanism for Real Time Blade Pitch Actuation for a Straight-Bladed Vertical Axis Wind/Water Turbine”. Patent Filed 2016.

3.1.6 Newspaper Articles

Columnist in the Al-Eqtisadiyah regional newspaper by writing a weekly article about recent issues related to Renewable Energy. So far contributed with over 140 articles

3.2 Technical Reports

Technical Reports not extracted from Ph.D. Thesis (*Considered for promotion to the rank of Associate Professor*)

- T01** **Haitham M.S. Bahaidarah**: “Numerical Analysis of Fluid Flow and Heat Transfer in Channels with Shifted Wavy Walls”, **Final Report**, KFUPM Funded Research project # JF/2005-06, August 2006.
- T02** **Haitham M.S. Bahaidarah**: “Numerical Study Of Fluid Flow And Heat Transfer Over A Series Of In-Line Non-Circular Tubes Confined In A Parallel Plate Channel”, **Final Report**, KFUPM Funded Research project # SB060018, 30 September 2007.
- T03** **Haitham M.S. Bahaidarah**: “Numerical Investigation on Fluid Flow and Heat Transfer Characteristics of Converging-Diverging Sharp Edge-Shaped Wavy Channels”, **Final Report**, KFUPM Funded Research project # SB070009, 30 October 2008.
- T04** Syed M. Zubair (PI), Aftab Ahmed, **Haitham M.S. Bahaidarah**, Inam Muhammad, Iyad Alzaharnah, Muhammed Antar, Muhammed Yaqub, Kalimur Rahman, Salem Aldini, and Syed Shaahid. “Air-Conditioning Compressor Operating Problems”, **Final Report**, STC Funded Research project # ME002261, September 2006.
- T05** Hasan Badr (PI), Abdulaziz Al-Majed, Yehia Khulief, Mohamed Habib, Hasan Al-Yousef, **Haitham M.S. Bahaidarah**, Rached Ben Mansour, Mohamed Yousif Abido, Abdelaziz Bazoune, Mohammad Anis, Kamal Ali, Romeo Agua, Shaheen Azab Shaheen, Taofeek Ayinde, Ajaz Ali Khan, and Salin babu Bhaskar., “Development of Pass Through Electric Pump – Phase II: Design of A Prototype”. **Final Report**, ARAMCO Funded Research project # CPM02253, October 2007.
- T06** Syed Said (PI), Luai Al-Hadhrami, Yehia Khulief, Mohamed Habib, Hassan Badr, Rached Ben-Mansour and **Haitham M.S. Bahaidarah**., “Vortex Shedding-free

Strainer”. **Final Report**, ARAMCO Funded Research project # ME002254, May 2008.

- T07** Anwar Khalil Sheikh, A.F.M. Arif, Yaqoub Al-Nassar, **Haitham M.S. Bahaidarah**, Mohammed Younus, Hassan Iqbal and John O'Brien “Rapid Casting ’s of Non Ferrous and Ferrous Parts by Deploying Innovative Pattern and Mold Making Technologies Using Green Sand Plaster/Ceramics and Polymers”, **Final Report**, NSTIP Funded Research project # 08-ADV71-04-01, Aug 2010.

Technical Reports not extracted from Ph.D. Thesis (*Published after promotion to the rank of Associate Professor*)

- T08** **Haitham M.S. Bahaidarah** and P. Gandhidasan “Numerical Investigation of Heat Transfer Characteristics of Photovoltaic Panels with Cooling”, **Final Report**, KFUPM Funded Research project # SB101004, Feb. 2012.
- T09** Nacer Merah (PI), Abdel Salam Eleiche, Abdel Rahman Shuaib, Abul Fazal Arif, **Haitham M.S. Bahaidarah**, and Numan Abu-Dheir from KFUPM & David Wallace (PI), Warren Seering, Maria Yang and Victor Tang from MIT “Design At All Levels: Review and Enhancement”. **Final Report**, KFUPM-MIT collaborations Funded Research project # MIT10109, Aug. 2012.
- T10** Anwar Sheikh (PI), AFM Arif, Abdel Rahman N Shuaib, SM Zubair, Maged El-Shaarawi, and **Haitham M.S. Bahaidarah** from KFUPM & Steven Dubowsky (PI), Dan Frey, Steven Eppinger, and Richard Weismen, from MIT “Design and Manufacturing of Solar Power Systems and Devices for Challenging Environments”. **Final Report**, KFUPM-MIT collaborations Funded Research project # MIT10110, Nov. 2013.
- T11** **Haitham M.S. Bahaidarah**, P. Gandhidasan, Muzafferuddin Mahmood, and Anwar Sheikh, “Feasibility Study of Enhancing Photovoltaic Cell Output with a Non-Imaging Concentrator for Water Heating/Desalination”, **Final Report**, NSTIP Funded Research project # 10-ENE1376-04, Dec. 2013.
- T12** **Haitham M.S. Bahaidarah**, P. Gandhidasan and Fahad A. Al-Sulaiman “Investigation of Photovoltaic Panels Subjected to Uniform Cooling”, **Final Report**, KACST Funded Research project # A-L-11-0667, Feb. 2015.
- T13** **Haitham M.S. Bahaidarah**, P. Gandhidasan, and Mostafa H. Elsharqawy, “Investigation of a New Solar-Assisted Thermally Activated Unitary Air Conditioning System”, **Final Report**, KFUPM Funded Research project # RG1321 Air Conditioning and Refrigeration Research Group (ACRG), Nov. 2015.
- T14** **Haitham M.S. Bahaidarah**, and P. Gandhidasan, “Numerical Investigation of Uniform Cooling Techniques for Concentrated Photovoltaic Systems” KFUPM

Funded Research project # SB141008, **In-Progress**.

- T15** **Haitham M.S. Bahaidarah**, and P. Gandhidasan, “Numerical investigations of solar powered Membrane Based Liquid Desiccant Space Cooling System” KFUPM Funded Research project # IN141033, **In-Progress**.
- T16** **Haitham M.S. Bahaidarah**, Farooq Saeed, and M. Khalil Iraqi, “Development of a Reconfigurable Variable Blade-Pitch Control Mechanism for Vertical Axis Wind Turbines of Darrieus-Type ”, NSTIP Funded Research project # 14-ENE2337-04, **In-Progress**.
- T17** **Haitham M.S. Bahaidarah**, and P. Gandhidasan, “Numerical Investigation of Simultaneous Heat and Mass Transfer in a Bubble Column Liquid Desiccant Dehumidifier” KFUPM Funded Research project # SB151006, **In-Progress**.

3.3 Funded Research Projects

3.3.1 KFUPM Funded Projects Completed or In-Progress

Funded Research Projects not extracted from Ph.D. Thesis (*Considered for promotion to the rank of Associate Professor*)

- 1. Principal Investigator – Haitham M. Bahaidarah (PI)** and S. M. Zubair (Consultant), “Numerical Analysis of Fluid Flow and Heat Transfer in Channels with Shifted Wavy Walls”. KFUPM funded 12 months, 36,580 SR project under the project number JF050006, **(9/2005-8/2006, Completed)**. This project was funded by KFUPM under Junior Faculty Grant Track scheme. I was actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. This project was successfully completed and resulted in publication (paper # J04 above) in ISI listed journals.
- 2. Principal and Solo Investigator – Haitham M. Bahaidarah (PI)**, “Numerical Study of Fluid Flow and Heat Transfer Over a Series of In-Line Non-Circular Tubes Confined In A Parallel Plate Channel”. KFUPM funded 18 months, 65,800 SR project under the project number SB060018, **(3/2006-9/2007, Completed)**. This project was funded by KFUPM under SABIC/Fast Track scheme. I was actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. This project was successfully completed and resulted in one publication (paper # J03 above) in ISI listed journals.
- 3. Principal and Solo Investigator – Haitham M. Bahaidarah (PI)**, “Numerical Investigation on Fluid Flow and Heat Transfer Characteristics of Converging-Diverging Sharp Edge-Shaped Wavy Channels”. KFUPM funded 18 months, 74,600 SR project under the project number SB070009, **(5/2007-10/2008, Completed)**. This project was funded by KFUPM under SABIC/Fast Track scheme. I was actively

involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. This project was successfully completed and resulted in two publications (papers # J05 & C02 above) in ISI listed journals.

4. **Co-Investigator** – Nacer Merah (PI), Abdel Salam Eleiche, Abdel Rahman Shuaib, Abul Fazal Arif, **Haitham M. Bahaidarah**, and Numan Abu-Dheir from KFUPM & David Wallace (PI), Warren Seering, Maria Yang and Victor Tang from MIT “Design At All Levels: Review and Enhancement”. ***KFUPM-MIT Collaboration*** funded 24 months, project under the project number (EDU2-08), ***(9/2008-8/2010, Completed)***. This project aims at capitalizing on MIT/KFUPM collaboration to conduct an extensive review of the design, manufacturing, and related areas in ME-KFUPM and inculcate design and manufacturing integration in KFUPM’s Mechanical Engineering Department Curriculum. *The first objective* of this project is to define the knowledge and skills that an undergraduate mechanical engineering student should have in the domain of design synthesis. *The second objective* is to build consensus about the structure of a curriculum that will deliver this knowledge and these skills. *The third objective* is to offer prototype versions of the courses in this curriculum. This project was successfully completed and resulted in publications (papers # C04 above) in ISI listed journals.

5. **Co-Investigator** –Anwar Sheikh (PI), AFM Arif, Abdel Rahman N Shuaib, SM Zubair, Maged El-Shaarawi, and Haitham Bahaidarah from KFUPM & Steven Dubowsky (PI), Dan Frey, Steven Eppinger, and Richard Weismen from MIT. “Design and Manufacturing of Solar Power Systems and Devices for Challenging Environments”. ***KFUPM-MIT Collaboration*** funded 24 months, project under the project number (R6-DMN-08), ***(9/2008-8/2010, Completed)***. The need for clean renewable energy is a critical. It is widely believed that, in the next 20 to 25 years, 20 to 30 percent of the world’s power will need to come from clean, renewable sources. Potential sources include; wind, solar, nuclear, bio-fuels, and clean coal (with carbon capture). It is very unlikely that only one source will meet the entire world’s energy needs -- a suite of different technologies will be needed. Solar energy is surely part of the solution and therefore it is a major priority for research and development. I was partially involved in the tasks of the research project and the analysis of results and report writing. This project was successfully completed and resulted in publications (papers # J06 & C6 above) in ISI listed journals.

Funded Research Projects not extracted from Ph.D. Thesis (*Published after promotion to the rank of Associate Professor*)

6. **Principal Investigator** – **Haitham M. Bahaidarah (PI)** and P. Gandhidasan (CoI), “Numerical Investigation of Heat Transfer Characteristics of Photovoltaic Panels with Cooling”. KFUPM funded 12 months, 63,120 SR project under the project number SB101004, ***(3/2011-2/2012, Completed)***. This project was funded by KFUPM under SABIC/Fast Track scheme. The proposed research project involved the numerical investigation of heat transfer characteristics of Photovoltaic panels with cooling. Each system has its own advantages and disadvantages. The heat removal

factor which directly relates to the efficiency of the panel is higher in water cooled system than in the air cooled system. Whereas the air cooled model is preferred due to minimal use of material and low operating cost despite its poor thermo-physical properties. This study investigates the heat transfer characteristics of PV panels subjected to both air and water cooling mechanisms. I was actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. This project was successfully completed and resulted in one publication (papers # J07 above) in ISI listed journals.

7. **Principal Investigator – Haitham M. Bahaidarah (PI)**, P. Gandhidasan, and Mostafa H. Elsharqawy, “Investigation of a New Solar-Assisted Thermally Activated Unitary Air Conditioning System”, KFUPM Funded 2 years, 565,400 SR project under the project number RG1321, **(12/2013-11/2015, Completed)**. This project was funded by KFUPM under Air Conditioning and Refrigeration Research Group (ACRG) scheme. The study is based on chemical dehumidification of air followed by evaporative cooling. The major energy required for the proposed system is low grade thermal energy such as solar energy for the regeneration of the desiccant. In order to make the system compact and to be used as the window type unit, rotor disc is used for the dehumidifier. The proposed system works at atmospheric conditions and hence the construction is simpler. The proposed system offers an environmental friendly air conditioning system. It provides 100% fresh air without the application of chlorofluorocarbon and other similar refrigerants. A laboratory scale experimental facility has been fabricated to evaluate the performance of a desiccant based air conditioning system and to validate the proposed theory. I was actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. This project was successfully completed and resulted in one publication (papers # J014 & Book Chapter BC01 above) in ISI listed journals.
8. **Principal Investigator – Haitham M. Bahaidarah (PI)** and P. Gandhidasan (CoI), “Numerical Investigation of Uniform Cooling Techniques for Concentrated Photovoltaic Systems”. KFUPM funded 18 months, 74,030 SR project under the project number SB141008, **(4/2015-10/2016, In-progress)**. This project was funded by KFUPM under SABIC/Fast Track scheme. The objective of this work is to model and numerically investigate the effect of uniform cooling techniques applied to the parameters of concentrated PV systems. For the uniform cooling of CPV Panels, design of Jet Impingement configuration is proposed to eliminate non-uniform heat transfer across the surface of the CPV Panel. This research will be achieved by modeling uniform cooling configuration of CPV system. I am actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. So for this project resulted in publications (papers # C15, C16 & C17 above) in ISI listed journals.
9. **Principal Investigator – Haitham M. Bahaidarah (PI)** and P. Gandhidasan (CoI), “Numerical investigations of solar powered Membrane Based Liquid Desiccant Space Cooling System”. KFUPM funded 12 months, 72,490 SR project under the project number IN141033, **(4/2015-11/2016, In-progress)**. This project was funded

by KFUPM under SABIC/Fast Track scheme. This study numerically investigate the heat and mass transfer characteristics of the selected membrane dehumidifier under the different climatic parameters in Saudi Arabia in order to perform a separate control of air humidity. I am actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. So for this project resulted in publications (Book Chapter BC02 above) in ISI listed journals

10. **Principal Investigator – Haitham M. Bahaidarah (PI)** and P. Gandhidasan (CoI), “Numerical Investigation of Simultaneous Heat and Mass Transfer in a Bubble Column Liquid Desiccant Dehumidifier”. KFUPM funded 18 months, 60,170 SR project under the project number SB151006, **(4/2016-10/2017, In-progress)**. This project was funded by KFUPM under SABIC/Fast Track scheme. A novel mathematical model will be generated and validated with experimental publications, this model will be optimized with ultimate objectives of reducing the energy consumption, increase the environment protection and improve the performance with less operating and initial cost. I am actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing.

3.3.2 Non-KFUPM Funded Projects Completed or In-Progress

Funded Research Projects not extracted from Ph.D. Thesis (*Considered for promotion to the rank of Associate Professor*)

11. **Co-Investigator – Syed M. Zubair (PI), Aftab Ahmed, Haitham M. Bahaidarah, Inam Muhammad, Iyad Alzaharnah, Muhammed Antar, Muhammed Yaqub, Kalimur Rahman, Salem Aldini, and Syed Shaahid.,** “Air-Conditioning Compressor Operating Problems”. *STC* funded 12 months, 200,000 SR project under the project number (ME002261), **(10/2005-9/2006, Completed)**. This technical project was based on the request for proposal entitled R&D Technical Support RFP issued by Saudi Telecom’s R&D department, and dated October 9, 2005. The project was to address air-conditioning operating and maintenance problems at Saudi Telecom systems. The project team was involved in identifying operating and maintenance problems and presenting ways and means of reducing air-conditioning systems failures. Both short-term and long-term solutions were presented as an outcome of the project.
12. **Co-Investigator – Hasan Badr (PI), Abdulaziz Al-Majed, Yehia Khulief, Mohamed Habib, Hasan Al-Yousef, Haitham M. Bahaidarah, Rached Ben Mansour, Mohamed Yousif Abido, Abdelaziz Bazoune, Mohammad Anis, Kamal Ali, Romeo Agua, Shaheen Azab Shaheen, Taofeek Ayinde, Ajaz Ali Khan, and Salin babu Bhaskar.,** “Development of Pass Through Electric Pump – Phase II: Design of A Prototype”. *ARAMCO* funded 24 months, 1,400,000 SR project under the project number (CPM02253), **(9/2005-10/2007, Completed)**. The project aimed to carry out a complete design of Pass Through ESP system based on a typical Saudi ARAMCO oil well ESP application for a 7” casing. The work included the design of the pump, motor, seal section, and pass through standing plug system. It also included the

preparation of the specification and detailed drawings needed for manufacturing the new ESP system.

13. **Co-Investigator** – Syed Said (PI), Luai Al-Hadhrami, Yehia Khulief, Mohamed Habib, Hassan Badr, Rached Ben-Mansour and **Haitham M. Bahaidarah.**, “Vortex Shedding-free Strainer”. **ARAMCO** funded 36 months, 1,217,700 SR project under the project number (ME002254), **(6/2005-5/2008, Completed)**. The project aimed to investigate the flow induced frequency in the compressor strainer pipe through the numerical simulation of the flow in the pipe including the strainer. The flow field of the pipe including the strainer was numerically modeled. The model was based on the solution of the equations governing the unsteady flow inside the pipe including the strainer and aimed at the determination of the magnitude of the vibration frequency. The results were analyzed in order to provide recommendations for possible solutions to eliminate the vibration frequency. The project also aims to provide stress analysis calculations for the strainer under steady condition.
14. **Co-Investigator** – Khalid Mezgani (PI), Rached Ben-Mansour, and **Haitham M. Bahaidarah**, “Effect of Blend Ratio and Branch Type of Locally Made LDPE & LLDPE on Film Blowing Process: Experimental and Numerical Study”. **KACST** funded 36 months, 1,545,200 SR project under the project number (19-26-TA), **(3/2007-3/2010, Completed)**. The plastics industry is rapidly growing in Saudi Arabia. One of its major products is linear low density polyethylene (LLDPE), which is produced in large quantities by the local industry. This polymer can be produced by copolymerization of different monomers which leads to distinct branch type in this polymer. Within the family of PE resins, LLDPE resins have found extensive applications in the areas of food packaging, heavy duty sacks, stretch and shrink wrap, agricultural films, medical, trash bags, etc. These numerous applications demand a vast range of application performance benefits that can rarely be met by one resin alone. Most of these films are manufactured using film blowing process. Almost 70% of the commercial LLDPE and LDPE are used in the form of blown and/or cast films. Since these two polymers (LLDPE and LDPE) are highly used in film blowing process, it is necessary to study the effect of the branch type and blend ratio on the manufacturing process parameter as well as the final mechanical properties of the products.

Funded Research Projects not extracted from Ph.D. Thesis (*Published after promotion to the rank of Associate Professor*)

15. **Principal Investigator** – **Haitham M. Bahaidarah (PI)**, P. Gandhidasan, Muzafferuddin Mahmood, and Anwar Sheikh, “Feasibility Study of Enhancing Photovoltaic Cell Output with a Non-Imaging Concentrator for Water Heating/Desalination”, NSTIP Funded 2 years, 1,184,200 SR project under the project number 10-ENE1376-04, **(05/2011-12/2013, Completed)**. In this study a

laboratory scale bench-top PV strings were designed and built. They were tested with the symmetrical truncated CPC modules for different configurations with and without water cooling at a geographic location of Dhahran. In this study the developed theoretical model is validated against experimental data for various configurations and found the agreement between them are very good. The impact of various operating parameters are evaluated and presented in the report. I was actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. This project was successfully completed and resulted in publication (papers # J09, J11, J13, C05 & C07 above) in ISI listed journals.

16. **Principal Investigator – Haitham M. Bahaidarah (PI)**, P. Gandhidasan (CoI), and Fahad A. Al-Sulaiman (CoI), “Investigation of Photovoltaic Panels Subjected to Uniform Cooling”, KACST Funded 2 years, , 1,063,060 SR project under the project number # A-L-11-0667, **(03/2013-02/2015, Completed)**. The project was about cooling of PV systems which is one of the key parameters to optimize the cell efficiency. The main design considerations for the cooling systems are low and uniform cell temperatures. The need for uniform cooling of PV panels arises due to the uneven solar flux distribution and temperature variations across the cell. Moreover conventional cooling mechanism does not address the issue of temperature variations. The objective of the current work is to model and experimentally validate the effect of uniform cooling techniques applied to the parameters of PV panels. I was actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing. This project was successfully completed and resulted in publications (papers # J12, J15, J16, C09, C10, C11, C12 & C14 above) in ISI listed journals.
17. **Principal Investigator – Haitham M. Bahaidarah (PI)**, Farooq Saeed (CoI), and M. Khalil Iraqi, “Development of a Reconfigurable Variable Blade-Pitch Control Mechanism for Vertical Axis Wind Turbines of Darrieus-Type ”, NSTIP Funded 2 years, 1,645,232 SR project under the project number # 14-ENE2337-04, **(09/2015-02/2017, In-progress)**. The research proposal deals with the development of a reconfigurable variable blade-pitch control mechanism for improved performance of the straight-bladed Darrieus (H-type) Vertical Axis Wind Turbines (VAWT). The proposed research is directly related to the priority area of Energy, in that it can be used to enhance performance or maximize annual energy production of wind turbines. The proposed research focus is to develop a variable blade-pitch control mechanism, a computationally coupled aerodynamic and mechatronic system model, for improved performance of the H-type VAWTs. A theoretical model for the aerodynamic and mechatronic system will be developed first and then used for the engineering design of the H-Type VAWT prototype and the associated mechatronic system model. I am actively involved in all the tasks of the project starting with the initial problem formulation, to the proposal writing, to the completion of research tasks, to the analysis of results and report writing.

3.4 Conference and Seminar Presentations

Seminars and conference presentations by me are listed below:

Date	Title of Presentation	Organizer / Place
October 10-13, 2004	Flow and Heat Transfer over a series of In-Line Cylinders Confined in a Channel.	41st Annual Technical Meeting of the Society of Engineering Sciences, Lincoln, NE, USA
June 18-22, 2007	Fluid Flow and Heat Transfer in Wavy Channels with Converging-Diverging Sharp Edge	Fifth International Conference on Computational Heat and Mass Transfer, Canmore, Calgary, Alberta, Canada,
September 08-10, 2009	Fluid Flow And Heat Transfer In Wavy Channels With And Without Baffles	First International Conference on Computational Methods for Thermal Problems, Thermacomp 2009, Naples, Italy
January 15-16, 2013	KFUPM Education & Research Experience in Renewable Energy	Energy Conservation Forum, Saudi ARAMCO, Dhahran, Saudi Arabia
June 16-21, 2013	Experimental Evaluation of the Performance of a Photovoltaic Panel with Water Cooling	39th IEEE Photovoltaic Specialists Conference, Tampa Bay, Florida, USA.
June 16-21, 2013	Performance analysis of a low concentrating PV-CPC system	39th IEEE Photovoltaic Specialists Conference, Tampa Bay, Florida, USA.
September 15, 2013	Role of Centers of Research Excellence in Knowledge Based Economy	Ministry of Higher Education Riyadh, Saudi Arabia
September 29-30, 2013	Contribution of Renewable Energy Technologies in Knowledge Based Economy	Solar Arabia Summit AL-Faisaliah Hotel Riyadh, Saudi Arabia
March 31, 2014	Renewable Energy Research Experience and Education in Saudi Arabia	British Council Nottingham University Nottingham, United Kingdom
June 8-13, 2014	Modeling and Comparative Analysis of Jet Impingement Cooling and Conventional Channel Cooling for Photovoltaic Strings	40th IEEE Photovoltaic Specialists Conference, Denver, Colorado, USA.
June 14-19, 2015	Experimental Performance Investigation of Uniform and Non-	42nd IEEE Photovoltaic Specialists Conference,

	uniform Cooling Techniques for Photovoltaic Systems	New Orleans, Louisiana, USA.
June 14-19, 2015	An Experimental Study of the Effect of Converging Channel Heat Exchanger on PV System	42nd IEEE Photovoltaic Specialists Conference, New Orleans, Louisiana, USA.
September 14-18, 2015	Thermo-economic feasibility study of Converging Channel Heat Exchanger for PV System installed in Dhahran	31st European Photovoltaic Solar Energy Conference and Exhibition, Hamburg, Germany.
September 14-18, 2015	Energy and economic analysis of Uniform and Non-Uniform Cooling Methods for PV panels by experimental setup	31st European Photovoltaic Solar Energy Conference and Exhibition, Hamburg, Germany.
June 05-10, 2016	Computational Fluid Dynamics Study for the Optimization of Surface Temperature Profile of Photovoltaic/Thermal System	43rd IEEE Photovoltaic Specialists Conference, Portland, Oregon, USA.
June 05-10, 2016	Performance Evaluation of Six Configurations of a Photovoltaic (PV) String with an Integrated Non-Imaging Concentrator and Water Cooling System.	43rd IEEE Photovoltaic Specialists Conference, Portland, Oregon, USA.

3.5 Conferences and Workshops Attended

3.5.1 International Conferences and Workshops:

- 2004 2004 ASME Heat/Fluid Engineering Conference." July 11-15, 2004 Charlotte, North Carolina, USA
- 2005 11th International Workshop on THERMAL INVESTIGATIONS of ICs and Systems 27 - 30 September 2005, Italy.
- 2006 the 5th International Conference on CFD in the Process Industries

13-15 December 2006, Melbourne, Australia.

- 2007 The 5th International Conference on Computational Heat and Mass Transfer, June 18-22, 2007, Canmore, Calgary, Alberta, Canada.
- 2008 The 5th European Thermal-Sciences Conference, May 18-22, 2008 Eindhoven, the Netherlands.
- 2009 First International Conference on Computational Methods for Thermal Problems Thermacomp 2009, September, 8-10, 2009, Naples, Italy.
- 2009 Institute for the Development of Excellence in Assessment Leadership and designation as an IDEAL Scholar, ABET, Baltimore, USA, August 2009.
- 2011 Desalination with Solar Energy, Spain, Almeria, May 2011.
- 2013 39th IEEE Photovoltaic Specialists Conference Conference, June 16-21, 2013, Tampa, Florida, USA.
- 2014 40th IEEE Photovoltaic Specialists Conference Conference, June 08-13, 2013, Denver, Colorado, USA.
- 2015 42nd IEEE Photovoltaic Specialists Conference Conference, June 14-19, 2015, New Orleans, Louisiana, USA.
- 2015 31st European Photovoltaic Solar Energy Conference and Exhibition, Sep., 2015, Hamburg, Germany.
- 2015 ASME 2015 International Mechanical Engineering Congress & Exposition, Nov. 13-19, 2015, Houston, Texas, USA.
- 2016 43rd IEEE Photovoltaic Specialists Conference Conference, June 05-10, 2016, Portland, Oregon, USA.

3.5.2 KFUPM Deanship of Academic Development Workshops :

- Implementing LEAN in Higher Education. 22-24 Aug. 2016.
- Conflict Management Workshop, Academic Leadership Center, Dec. 19, 2012.
- Change Management Workshop, Academic Leadership Center, Dec. 18, 2012.
- Research Team leadership, Deanship of Scientific Research, Nov. 15, 2009.
- Emerging Leader, June 10, 2009.
- Teaching and Learning Skills for Online Education, May 03-04, 2009.
- Developing a Plan to Assess Engineering Programs: Basic Principles, Best Practices, and Applications, April 13, 2009.
- Introduction to Blackboard CE 8 for CE 4 Users.
- Experimenting with Problem Based Learning (PBL) March 02-04, 2009.

- Programs Continuous Quality Improvement, September 14-16, 2008.
- Introduction to Centra Live, September 13, 2008.
- Sharing Experiences in using Web for Teaching, September 09, 2008.
- Getting Started with Blackboard CE, September 10, 2008.
- Assessment of Program Educational Objectives and Learning Outcomes, May 18, 2008.
- Feedback to Promote Learning, May 6, 2008.
- Content Development for Web-Based Courses using Macromedia Authorware, April 22, 27, 29, 2008.
- Basics of WebCT, April 01 & 06, 2008.
- Introduction to Technical Illustrations using Adobe Illustrator CS, March 17, 19, 24, & 26, 2008.
- The Art of Online Learning - Part 1, March 16 & 18, 2008.
- Managing Difficult Situations in Teaching, January 01, 2008.
- Effective Teaching Practices, December 30, 2007.
- Awarded a Certificate for the successful completion of “Research Management training Workshop” December 2007.
- Good Teaching & Effective Lecturing, November 14, 2007.
- Teaching for Learning, September 01-02, 2007.
- Online Course Content Authoring using Adobe e-Learning Suite (Flash, Photoshop, Illustrator), August 26-29, 2007.
- Content Development for Web-Based Courses using Macromedia Authorware, May 2007.
- Developing Strategic Alliances with National, Regional and International Institutions, 18th March 2007.
- Building your Academic Portfolio, February 2007.
- Instructional Design for Online Courses, December 03 - 12, 2006.
- Online Course Content Development Using Adobe Flash, November 18 - 27, 2006.
- Publishing Content and Quizzes in WebCT, November 04, 06 & 11, 2006.
- Effective Use of Collaborative Learning in the Classroom, September 20, 2006.
- Increasing Enrolment in Graduate Programs, (One of the KFUPM strategic plan projects) 17th September 2006.
- 5 days extensive workshop about GAMBIT and FLUENT, Chicago, USA, 2002.
- 5 days extensive workshop about PHINOX, KACST, Riyadh, Saudi Arabia, 1998.

3.5.3 KFUPM/Local Technical Workshops:

- Energy Conservation Forum, ARAMCO, Dhahran, Saudi Arabia, 15-16 January 2013.
- Saudi Arabia Smart Grid Conference & Exhibition SASG 2012, Jeddah, Saudi Arabia, 08-11 Dec. 2012.
- Evaluation of the Green Buildings Industry in Saudi Arabia and the GCC Region, KAUST, Jeddah, Saudi Arabia, 7 Oct. 2012.
- Forth Saudi Solar Energy Forum, KACARE, 8-9 May 2012, Riyadh, Saudi Arabia.
- 2nd KFUPM Technology Forum, Dhahran, Saudi Arabia, 25 April 2012.
- 2011 Energy Dialogue, King Abdullah Petroleum Studies and Research Center (KAPSRC), 20-22 Nov. 2011, Riyadh, Saudi Arabia
- Third Saudi Solar Energy Forum, KACARE, 3 April 2011, Riyadh, Saudi Arabia.

- Saudi Solar Energy Forum, ARAMCO, 10 Oct. 2010, Dhahran, Saudi Arabia.
- Solar Energy Communication and Coordination Workshop, KAUST, 16th May 2010, Jeddah, Saudi Arabia.
- Solar Energy Technology, KFUPM, 24th April 2010
- Application of Wind Power Technology in Saudi Arabia, 16-17 May 2009.
- Strategies For Success In Grant Proposal Writing, May 11 & 12, 2009.
- Innovation & Technology Licensing, 21 April 2009.
- 2nd Workshop on Engineering Design, April 19, 2009.
- An Advance in Fuel cell Technology, April 5, 2009.
- Measuring Research Performance, March 08 & 09, 2009.
- First workshop on Clean Water Clean Energy, KFUPM-MIT Collaboration, January 2009.
- Second Saudi Engineering Forum, KFUPM 2009.
- AJSE: Trends, Policies and Recognition, November 30, 2008.
- Advance in Solar energy Research & Technology, October 2008.
- First Saudi Engineering Forum, KFUPM 2006.

3.6 Supervision of M.S. Thesis/Ph.D. Dissertation

3.6.1 Co-Advisor (Co-Chairman) Ph.D. Dissertation

- I have received an invitation from my Ph.D. advisor to be a member of **Mr. Ijaz Ph.D.** Thesis committee (Invitation letter is attached). Mr. Ijaz has worked in the Numerical Heat Transfer Laboratory at Texas A&M University and he planed to extend my previous Ph.D. work. I have participated in their Computational Heat Transfer research efforts during the summer 2005 as a Short Term Scholar. This effort resulted in the joint journal publication given in **J03**.
- **Mr. Muhammad Umar Siddiqui. Ph.D.** “Development of an Energy Efficient Solar-Powered Aqua-Ammonia Absorption Refrigeration and Air-Conditioning System” April 2014. Ph.D. Dissertation Advisors: Dr. Syad Saed, Maged El-Sharawi, Amro Al-Qutub, Habib Abu-Hamayel and Haitham Bahaidarah.
- **Mr. Osman Kaleem Siddiqui. Ph.D.** “Analytical Investigation of Flow Distribution in Heat Exchanger Manifolds” In-Progress. Ph.D. Dissertation Advisors: Dr. Syad Zubair, Mohammed Antar, Shahzada Shuja and Haitham Bahaidarah,

3.6.2 Main Advisor (Committee Chair) M.S. Thesis

- **Mr. Abdul Subhan** (ID: g200902190), “Numerical and Experimental Analysis of

Photovoltaic Panel Cooling” M.S. Thesis. Advisors: Dr. Haitham Bahaidarah, P. Gandhidasan, and Wael Ahmed, May 2012. This effort resulted in the joint journal publications given in *J07, and J13*.

- **Mr. Ahmer Ali Bozdar Baloch** (ID: g201202120), “Uniform Cooling Systems for Photovoltaic Panels” M.S. Thesis. Advisors: Dr. Haitham Bahaidarah, P. Gandhidasan, and Fahad Al-Sulaiman, Dec. 2014. This effort resulted in the joint publications given in *J12, J15, J19, C09, C10, C12, C14, and C16*.
- **Mr. Mohand Husasein Al-Siddig** (ID: g201406880), “Numerical Investigations of Solar Powered Membrane Based Liquid Desiccant Space Cooling System” M.S. Thesis. Advisors: Dr. Haitham Bahaidarah, P. Gandhidasan, and Esmail Mokhaimer, In-Progress.
- **Mr. Mudhafar Mudhafar** (ID: g201519510), “Wind Turbine Design Cost and Scaling Model” M.S. Thesis. Advisors: Dr. Haitham Bahaidarah, In-Progress.

3.6.3 Co-Advisor (Committee Member) M.S. Thesis

- **Mr. Syed Ammar A. Tirmizi** (ID: 270139), “Performance Analysis of Chilled Water Systems and the Effect of Incorporation of Ejector Cooling System” M.S. Thesis. Advisors: Dr. P. Gandhidasan, Syad Zubair, and Haitham Bahaidarah, March 2010.
- **Mr. Bilal Tanweer** (ID: g201004340), “Modelling and Performance Analysis of Low Concentration Photovoltaic (LCPV) System” April 2014. M.S. Thesis. Advisors: Dr. P. Gandhidasan, Haitham Bahaidarah, and Anwar Shaikh. This effort resulted in the joint publications given in *J09, J11, J19, C05 and C06*.
- **Mr. Maimoon Atif**. “Thermal Analysis of Solar Tower integrated with Supercritical CO₂ cycles.” Oct. 2014. M.S. Thesis. Advisors: Dr. Fahad Al-Sulaiman, Haitham Bahaidarah, and Esmail Mokhaimer.
- **Mr. Muhammad Mujahid Rafique**. “Investigation of a New Solar-Assisted Thermally Activated Unitary Air Conditioning System” April 2014. M.S. Thesis. Advisors: Dr. P. Gandhidasan, Haitham Bahaidarah, and Luai Al-Hadrami. This effort resulted in the joint publications given in *J14, BC01 and BC02*.
- **Mr. Muhammad Ali Mahmoud**. “Feasibility study of sun powered, liquid desiccant based air conditioning system with extraction suitable for hot and humid climates in the Kingdom of Saudi Arabia ” In-Progress. M.S. Thesis. Advisors: Dr. P. Gandhidasan, Haitham Bahaidarah, and Syed Zubair.
- **Mr. Qazi Talal**. “Comparative Analysis of Thermal Conductivity of CaCl₂-based Liquid Desiccant by Adding Different Nanoparticles.” In-Progress. M.S. Thesis.

Advisors: Dr. P. Gandhidasan, Haitham Bahaidarah, and Esmail Mokhaimer.

- **Mr. Mujahid Omer S.A. Elobeid.** “Effect of Viscosity, Beta Ratio, Inclination and Water Cut on Venturi Pressure Drop Measurements.” In-Progress. M.S. Thesis. Advisors: Dr. A. Al-Sarkhi, Haitham Bahaidarah, and Luai Al-Hadrami.
- **Mr. Suleman Mohammed.** “Exergo-environmental analysis of a combustion gas turbine system subjected to inlet air cooling and evaporative after cooling of the compressor discharge.” In-Progress. M.S. Thesis. Advisors: Dr. Abdul-Khaliq, Haitham Bahaidarah, and Luai Al-Hadrami.

3.7 Citations Received by Others

The following table represents the citation count as of 10-Sep.-2016 for all papers that are already published. My research work has been cited in highly reputed journals with over **130** non-self-citations by Scopus as shown below:

	Journal	ISI	Citation
J01	Haitham M.S. Bahaidarah , N.K. Anand, and H.C. Chen "Numerical Study of Fluid Flow and Heat Transfer Over a Bank of Flat Tubes" Numerical Heat Transfer Part-A, Volume 48, no. 4/01, September 2005 pp. 359-385.	ISI	18
J02	Haitham M.S. Bahaidarah , N.K. Anand, and H.C. Chen "A Numerical Study of Heat and Momentum Transfer in Channels with Wavy Walls" Numerical Heat Transfer Part-A, Volume 47, no. 5, March 2005 pp. 417-439.	ISI	28
J03	Haitham M.S. Bahaidarah , M. Ijaz, and N.K. Anand, "Numerical Study of Fluid Flow and Heat Transfer over a Series of In-Line Non-Circular Tubes Confined in a Parallel Plate Channel" Numerical Heat Transfer Part-B, Volume 50, Number 2 / August 2006 pp.97 – 119.	ISI	8
J04	Haitham M.S. Bahaidarah , "A Numerical Study of Fluid Flow and Heat Transfer Characteristics in Channels with Staggered Wavy Walls" Numerical Heat Transfer Part-A, Volume 51, Number 9 / June 2007 pp.877 – 898.	ISI	13
J05	Haitham M.S. Bahaidarah , "Fluid Flow and Heat Transfer Characteristics in Sharp Edge Wavy Channels with Horizontal Pitch" the Emirates Journal for Engineering Research (EJER) 14 (1), 53-63 (2009).		
J06	Haitham M.S. Bahaidarah , and Ahmet Z. Sahin "Thermodynamic Analysis of Fluid Flow in Channels with Wavy Sinusoidal Walls" Thermal Science, Year 2013, Vol. 17, No. 3, pp. 813-822.	ISI	1
J07	Haitham M.S. Bahaidarah , Abdul Subhan, P. Gandhidasan, and Shafiqur Rehman" Performance evaluation of a PV (photovoltaic) module by back surface water cooling for hot climatic conditions " Energy, 59 (2013) pp. 445-453.	ISI	33
J08	Najam ul Qadir, Syed A. M. Said and Haitham M. Bahaidarah , "Structural Stability of Metal Organic Frameworks in Aqueous Media – Controlling Factors and Methods to Improve Hydrostability and Hydrothermal Cyclic Stability" Microporous and Mesoporous Materials, 201 (2015) pp. 61-90.	ISI	11
J09	Haitham M. Bahaidarah , Bilal Tanweer, P Ghandidasan, Nasiru Ibrahim, Shafiqur Rehman, "Experimental and Numerical Study on Non-concentrating and Symmetric Unglazed Compound Parabolic Photovoltaic Concentration Systems" Applied Energy 2014, pp. 527-536.	ISI	7
J10	M. K. Hossain, Q. A. Drmosh, A. M. Wajeh, and Haitham M.S. Bahaidarah , "Silver nanoparticles on conducting electrode: A simple two-steps process for realizing plasmonic solar cell	ISI	0

	design ", Applied Physics A : Materials Science and Processing, 27 Aug. 2014, 117, pp. 459–465.		
J11	Haitham M. Bahaidarah , B. Tanweer, P. Gandhidasan, and S. Rehman, "A combined optical, thermal and electrical performance study of V-trough PV system – Experimental and analytical investigations" MDPI – Energies, 2015, 8, pp. 2803–2827.	ISI	4
J12	Ahmer A.B. Baloch; Haitham M. Bahaidarah ; P. Gandhidasan; and Fahad A. Al-Sulaiman., Experimental and numerical performance analysis of a converging channel heat exchanger for PV cooling., Energy Conversion and Management 103 (2015) 14–27.	ISI	4
J13	Haitham M. Bahaidarah , Shafiqur Rehman, Abdul Subhan, P. Gandhidasan, and Hasan Baig "PV module performance for the climatic conditions in Dhahran" Energy Exploration & Exploitation, Volume 33, Number 6, 2015 pp. 909–930.	ISI	
J14	Muhammad Mujahid Rafique, P. Gandhidasan, and Haitham M. Bahaidarah , "Liquid desiccant materials and dehumidifiers-A review" Renewable & Sustainable Energy Reviews, 56 (2016), pp. 179–195.	ISI	
J15	Haitham M. Bahaidarah , Ahmer A.B. Baloch, and P. Gandhidasan, "Uniform cooling of photovoltaic panels: A review" Renewable & Sustainable Energy Reviews, 57 (2016), pp. 1520–1544.	ISI	3
J16	Haitham M. Bahaidarah , "Experimental performance evaluation and modeling of jet impingement cooling for thermal management of photovoltaics " Solar Energy, Volume 135, October 2016, Pages 605–617.	ISI	
J17	Haitham M. Bahaidarah , "Entropy Generation during Fluid Flow in Sharp Edge Wavy Channels with Horizontal Pitch" Advances in Mechanical Engineering, 2016, Vol. 8(7) 1–10.	ISI	
J18	Amir Al-Ahmed, Haitham M. Bahaidarah and Mohammad A. Jafar Mazumder. "Biomedical perspectives of Polyaniline Based Biosensors". Advanced Materials Research Vol. 810 (2013) pp 173-216. © (2013) Trans Tech Publications, Switzerland.		
J19	Haitham M. Bahaidarah , Ahmer A.B. Baloch, and P. Gandhidasan, B. Tanweer, Muzafferuddin Mahmood " A comparative study on the effect of glazing and cooling for compound parabolic concentrator PV systems - experimental and analytical investigations" Energy Conversion and Management, 129 (2016) 227–239.	ISI	

Note: More details can be found in the Appendix H.

3.8 Contribution in Each Joint-Authored Journal Paper

J01	The problem formulation was mainly carried out by me. Further I contributed in all stages of investigation including literature review, numerical simulations, analysis and discussion of results. I also contributed in the write-up of the paper. My contribution is about 90%.
J02	The problem formulation was mainly carried out by me. Further I contributed in all stages of investigation including literature review, numerical simulations, analysis and discussion of results. I also contributed in the write-up of the paper. My contribution is about 90%.
J03	I was involved throughout including the contributions related to problem-setting, computations & numerical simulations, discussion of results and write-up of the paper. My contribution is about 60%.
J04	Single-Authored Paper
J05	Single-Authored Paper
J06	I was responsible for the project design, data collection and analysis and writing of the paper.
J07	I was responsible for the project design, data collection and analysis and writing of the paper.
J08	I was partially responsible for gathering the relevant literature and summarizing the main findings of the papers that are published in this specific field. I have prepared a detailed summary of relevant papers.
J09	The problem formulation was mainly carried out by me. Further I contributed in all stages of investigation including literature review, numerical simulations, analysis and discussion of results. I also contributed in the write-up of the paper.
J10	I was partly responsible for the project design, data collection and analysis and contributed to the writing of the paper.
J11	The problem formulation was mainly carried out by me. Further I contributed in all stages of investigation including literature review, numerical simulations, analysis and discussion of results. I also contributed in the write-up of the paper.
J12	I was partly responsible for the project design, data collection and analysis and contributed to the writing of the paper.
J13	The problem formulation was mainly carried out by me. Further I contributed in all stages of investigation including literature review, numerical simulations, analysis and discussion of results. I also contributed in the write-up of the paper.
J14	I was partially responsible for gathering the relevant literature and summarizing the

	main findings of the papers that are published in this specific field. I have prepared a detailed summary of relevant papers.
J15	I was responsible for gathering the relevant literature and summarizing the main findings of the papers that are published in this specific field. As I was gathering the literature I looked over 200 publications that are somewhat relevant to this topic and by the end of my literature survey I have prepared a detailed summary of over 100 relevant papers. After that we agreed to prepare a comprehensive manuscript for a very high impact journal in the field.
J16	Single-Authored Paper
J17	Single-Authored Paper
J18	I was partly responsible for the project design, data collection and analysis and contributed to the writing of the paper.
J19	The problem formulation was mainly carried out by me. Further I contributed in all stages of investigation including literature review, numerical simulations, analysis and discussion of results. I also contributed in the write-up of the paper.

3.9 Seven (7) Publications Considered as Main Contribution

J07. Haitham M.S. Bahaidarah, Abdul Subhan, P. Gandhidasan, and Shafiqur Rehman" Performance evaluation of a PV (photovoltaic) module by back surface water cooling for hot climatic conditions " **Energy**, 59 (2013) pp. 445-453.

Summary of main results:

The performance of PV (photovoltaic) module is strongly dependent on its operating temperature. Most of the energy absorbed by the panel is converted to heat which is normally lost and provides no value. In order to study the performance of a hybrid PV water cooled system, a numerical model (electrical and thermal) is developed using EES (Engineering Equation Solver) software. The model predicts various electrical and thermal parameters affecting its performance. The effect of cooling the module by incorporating a heat exchanger (cooling panel) at its rear surface is also investigated experimentally. The results of the numerical model are found in good agreement with the experimental measurements performed for the climate of Dhahran, Saudi Arabia. With active water cooling, the module temperature dropped significantly to about 20% leading to an increase in the PV panel efficiency by 9%.

J09. Haitham M. Bahaidarah, Bilal Tanweer, P Ghandidasan, Nasiru Ibrahim, Shafiqur Rehman, "Experimental and Numerical Study on Non-concentrating and Symmetric Unglazed Compound Parabolic Photovoltaic Concentration Systems" **Applied Energy**, 2014, pp. 527-536.

Summary of main results:

Comparative study on flat photovoltaic (PV) string and symmetric compound parabolic concentrator (CPC) photovoltaic system has been presented in this paper. Two flat PV strings and two unglazed PV–CPC systems are considered. The cells of each of the flat PV and PV–CPC strings are subjected to cooling to reduce temperature. The performance of the two configurations with and without cooling is evaluated numerically and experimentally. The numerical models for the flat PV string and the PV–CPC systems are solved using Engineering Equation Solver (EES) software and the concentration ratio of the CPC system is considered as 2.3X. Absorbed energy is calculated with and without cooling for the PV–CPC and flat PV systems. The absorbed energy is used to solve the energy balance equations on different nodes of the system from which the cell temperature was determined. The results showed that the maximum power output of the flat PV string with cooling was approximately 21W which gives about 49% more than the power obtained without cooling. The maximum power output of the PV–CPC system with cooling was approximately 34W which is about twice of the power obtained in the absence of cooling. It was found that the power output of the PV–CPC system is higher than that of the flat PV string with and without cooling by 39% and 23% respectively. Comparison of the numerical results with experimental data showed good agreement for the two configurations. The maximum percentage differences between the numerical and experimental power output for the flat PV with and without cooling are 5% and 7%, respectively. While those of the PV–CPC system with and without cooling are 9% and 11%, respectively.

J12. Ahmer A.B. Baloch; **Haitham M. Bahaidarah**; P. Gandhidasan; and Fahad A. Al-Sulaiman., Experimental and numerical performance analysis of a converging channel heat exchanger for PV cooling., **Energy Conversion and Management** 103 (2015) 14–27.

Summary of main results:

An experimental and numerical investigation of a cooling technique called as converging channel cooling intended to achieve low and uniform temperature on the surface of PV panel is presented in this paper. Experimental evaluation for an uncooled PV system and a converging channel cooled PV system was carried out subjected to the hot climate of Saudi Arabia for the month of June and December. Detailed modeling was performed using numerical analysis to investigate the effect of changing the converging angle on the thermal characteristics of the PV system. Based on the developed model, two degrees angle showed the best performance in terms of temperature distribution and average cell temperature with a standard deviation of 0.91 °C. A comprehensive system model was developed to assess the performance of PV systems numerically by coupling the optical, radiation, thermal, computational fluid dynamics, and electrical model. Thermal measurements for an uncooled PV showed cell temperature as high as 71.2 °C and 48.3 °C for the month of June and December, respectively. By employing converging cooling, cell temperature was reduced significantly to 45.1 °C for June and to 36.4 °C for December. Maximum percentage improvement in power output was 35.5% whereas maximum percentage increase in the conversion efficiency was 36.1% when compared to the performance of an uncooled PV system. For cost feasibility of an uncooled and cooled PV system, levelized cost of energy (LCE) analysis was performed using the annual energy yield simulation for both systems. LCE was found to be 1.95(€/kW h) for an uncooled PV system which was reduced to 1.57(€/kW h) for converging cooled PV system with a relative percentage decrease of 19.5%, hence making it economically viable.

J14. Muhammad Mujahid Rafique, P. Gandhidasan, and **Haitham M. Bahaidarah**, "Liquid desiccant materials and dehumidifiers-A review" **Renewable & Sustainable Energy Reviews**, 56 (2016), pp. 179–195.

Summary of main results:

It is important to decrease the energy cost of heating, ventilating and air conditioning (HVAC) systems without compromising indoor air quality and comfort conditions due to the rising cost of fossil fuels and other environmental concerns. Liquid desiccant cooling systems are one of the alternatives in this regard which is not only environmental friendly (no use of any refrigerant which deplete ozone layer) but at the same time make a good use of alternative sources of energy like, solar, biomass etc. This paper presents different commercially available liquid desiccants and their composites which combines the properties of two or more desiccant materials for better performance. A good desiccant should have better moisture absorption capability and lower temperature of regeneration. This paper also includes the different configurations of liquid desiccant dehumidifiers and their advantages as well as drawbacks. Some new configurations of liquid desiccant dehumidifiers have been introduced which greatly improves the system overall performance. Moreover, a summary of the performance parameters has been made to analyze the system performance. This review is meaningful for the research and technical development process of liquid desiccant technology.

J15. Haitham M. Bahaidarah, Ahmer A.B. Baloch, and P. Gandhidasan, "Uniform cooling of photovoltaic panels: A review" **Renewable & Sustainable Energy Reviews**, 57 (2016), pp. 1520–1544.

Summary of main results:

Cooling of PV panels is a critical issue in the design and operation of concentrated photovoltaic (CPV) technology. Due to high cell temperature and non-uniform temperature distribution, current mismatching problem and hot spot occurs on the cell resulting in either reduction of efficiency or permanent structural damage due to thermal stresses. Temperature non-uniformity on the surface of PV panel has a major impact on the performance of CPV systems and directly increases cell temperature and series resistance. This review paper highlights the importance of uniform PV cooling by exploring the possible causes and effects of non-uniformity. Cooling techniques with low average cell temperature and uniform temperature distribution are analyzed. Economic and environmental impact for cooling systems are discussed and an experimental case study is presented for comparison between uniform and non-uniform cooling methods. Various uniform cooling techniques have been applied to manage the thermal state of solar cell and increase the performance of PV systems. Immersion cooling is a promising solution for uniform cooling and has been reported to reduce the cell temperature to 20–45°C for CPV systems. Heat pipes as thermal management solution reduced the temperature down to 32°C with the best case temperature non-uniformity of 3°C. Passive cooling by heat sinks was found to reduce the cell temperature as low as 37°C for high concentrations but with an expense of large heat sink area. Active cooling by microchannels, impingement cooling and hybrid microchannel–impingement cooling were found to be most effective in dissipating high heat flux from PV surface. Cell temperature was reported to decrease to 30°C for 200X concentration system using impingement cooling. For hybrid cooling, deviation of 0.46°C surface temperature was obtained. Using PCM materials temperature of panel was controlled within 28–65°C whereas optimization of heat exchanger designs also showed low and uniform temperature across surface. The impact of non-uniformity was found to be significant for all PV systems however the effect is more pronounced in CPV system.

J16. Haitham M. Bahaidarah, "Experimental performance evaluation and modeling of jet impingement cooling for thermal management of photovoltaics " **Solar Energy**, Volume 135, October 2016, Pages 605–617.

Summary of main results:

Thermal management of PV systems is one of the most important factors that affect the overall performance especially in hot climate regions. This paper discusses the viability of jet impingement cooling for PV panels subjected to the climatic conditions of Dhahran region of Middle East. Experimental and numerical performance evaluation was carried out for two configurations, an uncooled PV system and an impingement cooled PV system. The complete cooling model incorporates optical, radiation, thermal, geometric and electrical model for the overall performance analysis of the PV system. Jet impingement geometric model for PV was developed to carry out the heat transfer analysis for single nozzle for analyzing the cell temperature, power output and conversion efficiency of PV strings. For precise prediction of the performance of the PV cell, seven parameters electrical model is employed, whereas for absorbed radiation calculation isotropic sky model is adopted. Temperature measurements revealed cell temperature as high as 69.7°C and 47.6°C for an uncooled system for June and December, respectively. By applying jet cooling, average cell temperature was reduced to 36.6°C for June and 31.1°C for December. Power output and conversion efficiency was enhanced by 51.6 % and 66.6 % by employing jet cooling for June, respectively. Similarly, December results revealed performance improvement by 49.6% in power output and 82.6 % in conversion efficiency. Simulation carried out reveals that jet cooling with optimum parameters has not only significantly increased the electrical power output and cell efficiency but has reduced the cell temperature while keeping it uniform for each cell.

J19. Haitham M. Bahaidarah, Ahmer A.B. Baloch, and P. Gandhidasan, B. Tanweer, Muzafferuddin Mahmood " A comparative study on the effect of glazing and cooling for compound parabolic concentrator PV systems - experimental and analytical investigations" **Energy Conversion and Management**, 129 (2016) 227–239.

Summary of main results:

A key barrier to achieving the economic viability and widespread adoption of photovoltaic (PV) technology for the direct conversion of solar radiation to electricity is the losses related to the high operating temperatures of typical flat-type PV modules. This technical and economic study addresses the cost reduction of PV systems by proposing a methodology for the improvement of solar cell efficiency using low-concentration PV technology and compound parabolic concentrators (CPCs). A theoretical model was developed to evaluate the performance of PV-CPC systems considering their optical, thermal and electrical properties. The model was implemented to investigate glazed and unglazed PV-CPC systems with and without active cooling and it was validated against experimental data. A laboratory-scale bench-top PV string was designed and built with symmetrically truncated CPC modules in these four configurations. The constructed glazed and unglazed PV-CPC systems were used for measurements at the geographic location of Dhahran and showed a very good agreement of 3.8-6.5% between the calculated and experimental results. The effect of glazing was studied and from the electrical point of view, glazing was found to reduce the power output. From the thermal point of view, glazing increased the thermal gain of the PV-CPC system. An unglazed PV-CPC system is recommended for greater electric power output, and glazed system is recommended for higher thermal gain. For economic feasibility, levelized cost of energy (LCE) analysis was performed using annual power output simulations and cost parameters incurred in the installation and operations phase of four systems considered. Annual power output was found to increase by 53.45% for unglazed CPC and 37.1% for glazed CPC systems. The minimum LCE of 0.84 (€/kWh) was found for unglazed CPC with cooling whereas the maximum LCE of 1.67(€/kWh) was obtained for glazed uncooled system due to high cell temperatures.

4.0 PROFESSIONAL ACTIVITIES

4.1 Membership and Educational Consulting

4.2 Review

4.3 Organization of Workshops/Scientific Events

4. PROFESSIONAL ACTIVITIES

4.1 Membership and Educational Consulting

4.1.1 Membership

- Chairman of Saudi Society of Mechanical Engineers [SSME]
- Member of American Society of Mechanical Engineers [ASME]
- Member of The Institute of Electrical and Electronics Engineers [IEEE].
- Member of Saudi Council of Engineers [SCE]
- Member of the National photovoltaic solar energy systems technical committee belonging to The Saudi Standards, Metrology and Quality Organization (SASO).

4.1.2 Educational Consulting

- Appointed by the Ministry of Higher Education to chair a committee for 2-years (2013–2014) to review the Engineering College program of Prince Mohammad University (PMU).

4.1.3 Technical Consulting

- Ministry of Communications and Information Technology, Part time Consultations regarding e-Government Transformation.
- First Solar Peer Review, Invitation to participate in the review to assess the Environmental and Health Safety (EHS) aspects of CdTe photovoltaic (PV) systems over their entire life cycle.

4.2 Review

4.2.1 I was invited to review in the following international journals:

- ASME Journal of Heat Transfer.
- Numerical Heat Transfer.
- Energy, Elsevier.
- Renewable and Sustainable Energy Reviews, Elsevier
- Energy Conversion and Management, Elsevier.
- Solar Energy, Elsevier.
- International Journal of Thermal Sciences, Elsevier.
- Journal of Microscopy and Ultrastructure, Elsevier.
- Journal of King Saud University: Engineering Sciences.

4.2.2 I was invited to review in the following international Conference:

- ASME 2016 Power and Energy Conference, Charlotte, North Carolina 2016.
- International Mechanical Engineering and Congress & Exposition (IMECE), Denver, Colorado 2011.
- Fifth International Conferences on Energy Research and Development, Kuwait 2012.

- ASHRAE, First International Conference on Energy and Indoor Environment for Hot Climates, Qatar 2014.
- 5th Saudi Student Conference, Saudi Arabia 2014.

4.2.3 I was invited to review in the following Project Proposal/ Final Report:

- Reviewed several grant proposals and final reports submitted to DSR, KFUPM.
- Reviewed several grant proposals and final reports submitted to KACST.

4.3 Organization of Workshops/Scientific Events/Seminars

- Member of the Publicity Committee of the event “2nd Saudi Engineering Forum” held at KFUPM in March, 2009. The event consisted of 16 lectures and 2 workshops, and was attended by faculty members from various departments of KFUPM and Engineers from all major industry in the Kingdom. The average attendance in the event was about 500.
- Member of the Organizing Committee of the 1st Saudi Renewable Energy Conference and Exhibition held at KFUPM in Feb. 19-21, 2012. The event was attended by faculty members from various departments of KFUPM and Engineers from all major industry in the Kingdom. The average attendance in the event was about 600.
- Member of the Organizing Committee of the 5th Meeting of the Saudi Research institute Deans, Strategic Partnership for sustainable development, 26-27 February 2013.
- Representing KFUPM Center of Research Excellence in Renewable Energy at Saudi Aramco Energy Campaign, April 2013.
- Participating at 3rd KFUPM Research Day to represent the Center of Research Excellence in Renewable Energy, May 2013.
- Participating Energy Awareness Program to the society at SciTech by representing the Center of Research Excellence in Renewable Energy, June 2013.
- Member of the Organizing Committee of the Annual Mechanical Engineering Open Day to help students choose their major.

5.0 UNIVERSITY, DEPARTMENTAL AND PUBLIC SERVICE

5.1 Committee Work

5.2 Other Departmental Services

5.3 Public and Community Services

5.0 UNIVERSITY, DEPARTMENTAL AND PUBLIC SERVICE

5.1 Committee Work

5.1.1 National Level Committee

- 2013–2015 Member of the National photovoltaic solar energy systems technical committee belonging to The Saudi Standards, Metrology and Quality Organization (SASO).

5.1.2 Ministry of Higher Education Committee

- 2013–2014 Appointed by the Ministry of Higher Education to chair a committee for 2-years to review the Engineering College program of Prince Mohammad University.

5.1.3 University Board Level at KFUPM

- 2014 – 2016 Appointed by the University Board to be a Member of the Scientific Council for 2-years.
- 2016 – 2018 Appointed by the University Board to be a Member of the Scientific Council for 2-years.

5.1.4 University Level Committees at KFUPM

- 2004-2005 Member of the Staff Affaires Standing Committee.
- 2006-2007 Member of the Admissions & Academic Standing Committee.
- 2007-2008 Member of the Scientific Research Standing Committee.
- 2007-2008 Member of the Ad Hoc Committee of the Best Short Course Award.
- 2007-2008 Member of the Ad Hoc Committee of the Graduate Grant Guidelines.
- 2008-2009 Member of the Faculty Affaires Standing Committee.
- 2008-2009 Member of the Ad Hoc Committee of the Best Short Course Award.
- 2008-2009 Member of the Ad Hoc Committee for Evaluating the Innovative Ideas Awards.

5.1.5 Research Institute Committees

- 2010-2011 Member of RI Council.
- 2010-2011 Member of RI Policy and Planning Committee.
- 2010-2011 Member of RI Personnel Committee.
- 2010-2011 Member of the Executive Committee for the Center for Research Excellence in Renewable Energy.
- 2010-2011 Chairman of Proposal Evaluation Committee.
- 2010-2011 Chairman of Project Budget Committee.
- 2010-2011 Chairman of RI Publication Committee.
- 2010-2011 Chairman of Ad Hoc Outstanding Applied Research Award Committee.
- 2010-2011 Chairman of Ad Hoc Committee of Space Allocation Committee.
- 2010-2011 Chairman of Ad Hoc Committee of University Collaboration Program with ARAMCO.
- 2010-2011 Chairman of Ad Hoc Committee of (KACARE) Establishment of National Research Centers.
- 2011-2012 Member of RI Council.
- 2011-2012 Member of RI Policy and Planning Committee.
- 2011-2012 Member of RI Personnel Committee.
- 2011-2012 Member of the Executive Committee for the Center for Research Excellence in Renewable Energy.
- 2011-2012 Chairman of Proposal Evaluation Committee.
- 2011-2012 Chairman of Project Budget Committee.
- 2011-2012 Chairman of RI Publication Committee.
- 2011-2012 Chairman of Ad Hoc Outstanding Applied Research Award Committee.
- 2011-2012 Chairman of Ad Hoc Committee of Space Allocation Committee.
- 2011-2012 Member of the KFUPM-Dupont Steering Committee.
- 2011-2012 Chairman of Committee to organize Research Exhibition.
- 2011-2012 Member of Ad Hoc Committee of KACST Technology Innovation Center (TIC).

5.1.6 College Level Committees at KFUPM

- 2004-2005 Member of the Best Teaching Award Committee.
- 2007-2008 Chairman of Ad Hoc Committee of the Best Short Course Award.
- 2008-2009 Member of the Second Engineering Forum Publicity Committee.

5.1.7 Dammam Community College

- 2016-2017 Member of the Dammam Community College Council.
- 2016-2017 Chairman of the Academic Standing Committee.
- 2016-2017 Chairman of the Academic Affair Committee.
- 2016-2017 Chairman of the NCAAA Committee.
- 2016-2017 Member of Quality Assurance Committee.
- 2016-2017 Member of Faculty, Staff and Community Affairs Committee.
- 2016-2017 Member of Strategic Planning Committee.

5.1.8 Departmental Level Committees at KFUPM

- 2004-2005 Member of the Academic/Text Book Committee.
- 2005-2006 Chairman, Student Affairs Committee.
- 2005-2006 Member of the Public Relation Committee.
- 2005-2006 Member of the Teaching Assignments Committee.
- 2006-2007 Member of the M.E. Graduate/Doctoral Committee.
- 2007-2008 Chairman, Continuing Education Committee.
- 2008-2009 Member of the M.E Strategic Planning & Faculty Search Committee.
- 2008-2009 Member of the ME New Curriculum Committee.
- 2014-2015 Member of the ME New Graduate Curriculum Committee.

- 2015-2016 Member of the ME Student Affairs Committee.

5.2 Other Departmental Services

Besides actively contributing in the administrative affairs like faculty planning, budgeting and setting up the teaching schedules, I served the following standing or adhoc committees during my stay at KFUPM.

- 1) Participate in the Annual Open Day of Mechanical Engineering for the preparatory year Students.
- 2) Director of Computer Lab [Semester 071&072]
- 3) Director of Heat Transfer Lab [Semester 081&082].
- 4) I worked as a Department Chairman [Semester 073 and 143].
- 5) Coop Coordination for the years 2007/2008, 2008/2009 & 2009/2010.
- 6) Reviewed books related to ME 496 Special Topic of (Computational Fluid Dynamics) and contributed in selecting the textbook for the course.
- 7) As member of the corresponding teams, I contributed in setting the learning outcomes and completing the write-up for the courses ME 351.
- 8) Prepared a presentation for the department aimed to raise the awareness of the students about Mechanical Engineering to help them select their major. [Semester 082]
- 9) Reviewing Mechanical Engineering students Papers submitted to Saudi Students Conference. [Semester 122]
- 10) Preparing Ph.D. Comprehensive Exam (Entry Exam) for newly joined Graduate students [Semester 092 and 142]
- 11) Proctoring Ph.D. Comprehensive Exam (Entry Exam) for newly joined Graduate students.
- 12) Reviewing applicant's files and interviewing candidate of New Graduate Assistant.

1.3 Public and Community Services

Gifted Student Program

- A member of the organizing committee of the Gifted Student Program at KFUPM 2004-2007.
- The leader of the organizing committee of the Undergraduate Research Grant in the Gifted Student Program at KFUPM 2005.
- Participation on "The first meeting for Gifted Student of higher education." by King Abdulaziz University, Jeddah, 27-28 Feb 2006.
- A member of the organizing committee of "The fourth meeting for Saudi Inventors and Inventions exhibition." Jointly by KFUPM and King Abdulaziz & his Companions Foundation for the Giftedness and Creativity, March 2005.
- Participation on "The fifth scientific summer meeting for Gifted Student." 20 June – 17 July 2005. Role: Chairman, student affaire committee.
- Participation on "The sixth scientific summer meeting for Gifted Student." 30 June – 29 July 2007. Role: Vice president.

Study Skills

- A member of group of Faculty who teach a new established course (University Study Skills) for new preparatory year students in the University.
- Presenting a lecture about University Study Skills and how to live in foreign country for SABIC new students with international scholarships, Aug. 2006.

Other

- A member of the organizing committee of the 20th visit for GCC students.

- Organizer of a preparation program for one full week for SABIC's new students with international scholarships 2007.
- Organizer of a preparation program for one full week for SABIC's new students with international scholarships 2008.
- Participating in Energy Awareness Program to the society at SciTech by representing the Center of Research Excellence in Renewable Energy, June 2013

6.0 STATEMENT OF CONTRIBUTION

Teaching

Research

University, Department and Public Service

6.0 STATEMENT OF CONTRIBUTION IN TEACHING, RESEARCH AND UNIVERSITY AND PUBLIC SERVICE

6.1 Teaching

Belonging to a department offering a large number of courses with a tradition of high quality instruction, I have stayed committed in maintaining high quality instruction standard and have put in continuous efforts to carry out effective teaching of highest quality during my work at KFUPM. The overall quality of my teaching is reflected by consistent teaching evaluations around 8/10 giving me an average teaching evaluation of 8.4 in all the courses (33 sections) I have taught since joining KFUPM in 2004.

I would like to mention that throughout I have made efforts to improve my teaching by learning and adopting ways of enhancing my instructional methods, teaching effectiveness and students' learning. These efforts include attending/completing the following activities at KFUPM.

- WebCT Workshops
- Course Development using Authorware and Flash
- Workshop: "Instructional Design for Online Courses"
- Faculty and Students Motivation
- Workshop on Experience Sharing in Developing Online Courses

As a result I have succeeded in developing and implementing some innovative strategies for enhancing my instructional methods and teaching effectiveness. The most important of these has been the blending of my face-to-face course delivery with WebCT/Blackboard component in a manner that tremendous improvements in the content-delivery and course-understanding are achieved. I have developed well-structured and rich-in-material complete WebCT/Blackboard course packs for ME 203, ME 204, ME 311, ME 315, ME 316, ME 351, ME 439, ME 539 and ME/MATH 501/574 which can be used to supplement face-to-face teaching of these courses. Since the term 041, I have blended teaching of all of my courses with these WebCT/Blackboard course packs and my students' feedback suggests that this blending has indeed resulted in a marked improvement in their understanding and learning process. If needed, the WebCT/Blackboard course packs can be provided which can then be browsed by uploading to WebCT/Blackboard environment.

I have taken initiatives to integrate software in teaching of most of my courses. I have developed self-contained MATLAB/EES modules for ME 203, ME 204, ME 311, ME 315, ME 351 and ME 501 and have integrated in the respective courses since the term 041.

It must be noted that I made special efforts to integrate above mentioned software and WebCT/Blackboard component with my teaching in a manner that would result in maximizing the students' interest in the subject matter. Furthermore the in-class instructions were supplemented by active interactions with students during office hours, extra help-sessions and through e-learning activities like WebCT/Blackboard -discussions.

I have been involved in one of the KFUPM-MIT Educational projects entitled “Design At All Levels: Review and Enhancement”. This work was undertaken by a team of faculty members of the department as a project from the Center of Excellence for Scientific Research Cooperation with MIT and Center for Clean Water and Clean Energy at MIT and KFUPM which was started Sep. 2008 for almost 4 years. Along with my role of this project, I was actively involved in all stages which included significant contributions in content development as well as capitalizing on MIT/KFUPM collaboration to conduct an extensive review of the design, manufacturing, and related areas in ME-KFUPM and inculcate design and manufacturing integration in KFUPM’s Mechanical Engineering Department Curriculum. As a team member of this group, I participated in defining the knowledge and skills that an undergraduate mechanical engineering student should have in the domain of design synthesis. In a later stage, I have worked on the remaining *objectives* such as: to build consensus about the structure of a curriculum that will deliver this knowledge and these skills, and to offer prototype versions of the courses in this curriculum.

As a member of the Thermal Science group, I participated in the re-formulation of the contents and short listing of the textbooks for the undergraduate and graduate courses in thermo-fluid science, namely ME 203, ME 204, ME 311 and ME 315. I also contributed in the selection of the present textbook for the senior undergraduate special topic course ME 496. I was involved in the selection process of the presently used textbook for Thermodynamics courses and also contributed by designing the syllabi of the courses ME 203 and ME 204 according to the new textbook. I have also fulfilled the responsibilities of the course coordinator for ME 315 in semesters 072 and 081 and for ME 204 in semesters 141, 142 and 152.

The ME COOP program is a continuous period of 28 weeks spent in industry with the purpose of acquiring practical experience in different areas of Mechanical Engineering. Students are required to submit progress reports during their COOP period and a final report and give a presentation about their experience after they are back. As a Coop program Coordinator for three years, I have contributed in development of the coordination policy for ME 351. Being the Coordinator, I have heavily contributed in the development and preparation of the assigned Examining Committee; these involve preparation of 12 to 16 examining committees per semester. I was also involved in setting up the learning outcomes for this program as required by the department. I have actively contributed in the implementation of department’s initiatives and strategies of maintaining high quality instruction of this program.

As a Faculty of the Mechanical Engineering Department, I have participated in the annual ME Open Day activities that aim to increase the preparatory year student’s awareness about all fields related to mechanical engineering to help them decide selecting their major.

As an academic advisor to some of Mechanical Eng. major’s students, I am working very closely with my advisees to establish the best plan and to help them achieve the best GPA.

The efforts that I have put in teaching at KFUPM earned me the *department’s chairmanship for 073 and 143*. Then, I am recently appointed as *Assistant Dean of Dammam Community College* effective 21 August 2016.

6.2 Research

During my academic career, I have published **19 international Journal papers** and **17 Conference publications**. The details of these papers are given in the enclosed dossier. Since joining KFUPM in August 2004, I have participated in 2 Ph. D. and 12 M.S. (7 completed and 7 in progress) theses committee as an advisor or a committee member. In addition, I worked on many basic and applied research projects, some of them were internally funded by the university, while others were funded by KACST, NSTIP, STC, Saudi Aramco, and other local organizations.

I have been actively involved in a number of Research projects. Most of my research publications that appeared in the past years have been made out of the funded research projects. My research emphasis has been on renewable energy related topics such as solar energy resource assessment, solar thermal, solar photovoltaic (PV module) performance under local climatic conditions, and combined systems (thermal and PV) design and experimentation, and concentrated solar PV system.

Solar technology has become more attractive for electricity generation in the field of renewable energy. Solar energy is a clean energy which has the potential to meet a significant proportion of the Kingdom's energy needs. A key barrier to achieving economic viability and the widespread adoption of solar photovoltaic (PV) technology is due to its cost and losses related to high operating temperature. Therefore, I have a research project funded by National Science, Technology and Innovation Plan (NSTIP) for this purpose.

The aim of my research is to reduce the cost of the direct conversion of solar radiation to electricity and present higher efficiency than the typical flat-type photovoltaic (PV) modules using non-imaging concentrator namely compound parabolic concentrator (CPC). Since the efficiency of concentrating PV cells drops as the cell temperature increases, this thermal energy is transferred by circulating water through a designed heat exchanger at the rear surface of the PV cells. Thus, the solar system proposed in this research refers to the integration of PV and solar thermal technologies into one single system, in that both electricity and useful heat energy are produced. Heat removed from the cells could be used for domestic purposes or applicable for industrial processes.

Different configurations of PV systems with and without water cooling are investigated in this research which are; Flat PV string, Glazed, and Unglazed PV-CPC system. A laboratory scale bench-top PV string was designed and built. They were tested with the symmetrical truncated CPC modules for the above different configurations with and without water cooling at a geographic location of Dhahran. The findings and the outcome of this research project were a seed for another research project funded by King Abdulaziz City for Science and Technology (KACST) for the optimization of the solar PV system evaluation and improvement.

In the Kingdom of Saudi Arabia, PV panels perform under extreme conditions which leads to a drop in efficiency due to high cell temperature and temperature non-uniformity. Cooling of PV systems is one of the key parameters to optimize the cell efficiency. The main design considerations for the cooling systems are low and uniform cell temperatures. The need for uniform cooling of PV panels arises due to the uneven solar flux distribution and temperature variations across the cell. Moreover conventional cooling mechanism does not address the issue of temperature variations.

The objective of my research work was to model and experimentally validate the effect of

uniform cooling techniques applied to the parameters of PV panels. For uniform cooling of PV panels, design of jet impingement configuration and a converging channel was proposed to eliminate non-uniform heat transfer across the surface of the PV Panel. Also to examine the effect of non-uniformity, a rectangular channel is studied with an uncooled PV panel. This research was achieved by modeling and experimentation of four configurations for PV systems with and without uniform cooling. Computational Fluid Dynamics (CFD) was used for thermal modeling of converging channel. Thermal model for PV panel with impingement cooling was developed to notice the effect on thermal characteristics of the panel using different average heat transfer correlations. Experimental setup for cooling systems were manufactured and installed at the test facility with all the necessary equipment for data collection and analysis. Finally a comprehensive comparative analysis and experimental validation was carried out for the cases of uncooled, cooled and uniformly cooled PV strings for the climate of June and December. My major contributions in this regard are made in the series of research papers J09, J11, J12, J13, J15, J16, C05, C07, C09, C10, C11, C12, and C14.

Then, I have decided to dedicate some of my focus into energy consumption relate issues with a link to solar energy. In the Kingdom of Saudi Arabia, a vast amount of energy is used for air conditioning. On the east and west coastal regions of the Kingdom, the temperature and humidity are high during the summer months. Dehumidification of air in hot and humid conditions is as important as cooling and removal of moisture from the air is much easier to achieve than cooling the air. Thus air is used as the energy transfer fluid in the proposed system.

The objective of my research work was to develop solar assisted energy-efficient air conditioning system using desiccant technology with compact components, suitable for households since the demand for domestic production capacity of window type unitary unit is high. The proposed technology was based on chemical dehumidification of air followed by evaporative cooling. The major energy required for the proposed system was low grade thermal energy such as solar energy for the regeneration of the desiccant.

In order to make the system compact and to be used as the window type unit, rotor disc was used for the dehumidifier. The proposed system works at atmospheric conditions and hence the construction was simpler. The proposed system offers an environmental friendly air conditioning system. It provides 100% fresh air without the application of chlorofluorocarbon and other similar refrigerants. A laboratory scale experimental facility has been fabricated to evaluate the performance of a desiccant based air conditioning system and to validate the proposed theory.

As the Director of Center of Research Excellence in Renewable Energy (CoRE-RE) at the Research Institute, I am responsible for the overall development of laboratories in the Center. I have extensively contributed on solar power resources assessment for potential sites identification for the Kingdom of Saudi Arabia through collaboration with King Abdullah City for Atomic and Renewable Energy (KACARE). Also, I have played an important role in the Solar Cooling Lab development (a 7.5 KW state-of-the-art solar powered aqua-ammonia absorption refrigeration system) in collaboration with Stuttgart University, Germany. Also, I have put some effort on the Solar Cell Research Lab that focuses its efforts on amorphous Silicon (a-silicon) based photovoltaic solar cells. The lab conducted Research in collaboration with leading universities and industry research groups.

I have carried out research in the past (before I have been promoted to Associate professor in 2010) in my previous area of interest and research in Heat Transfer (in particular Heat Transfer Enhancement in Compact Heat Exchangers) and its interdisciplinary applications. Much of my research work in the past years has involved investigation of questions from the area of Computational Fluid Dynamics and Heat Transfer. Moreover, due to my tendency of learning to apply Numerical Methods of Partial Differential Equations (PDEs) in other fields, I have also got engaged in works related to utilization of these numerical methods in the study of Heat Transfer Enhancement. The applications of heat exchangers may be found in space heating and air-conditioning, power production, waste heat recovery, and chemical processing. Heat transfer enhancement is an extremely significant issue in many engineering applications especially those among compact heat exchangers. Tremendous amount of research are dedicated to the study of innovative ways of increasing the heat transfer rate in compact heat exchangers. Therefore, the questions related to their design and performance evaluation are of prime interest. My major contributions in this regard are made in the series of research papers J02, J03, J04, J05, C01, C02 and C03.

I have authored and co-authored 19 journal papers in internationally recognized refereed journals including journals from prestigious societies/organizations like Numerical Heat Transfer, Part A: Applications and Numerical Heat Transfer, Part B: Fundamentals. I have also published in Elsevier (a world leading publisher in Science and Technology) Journals like: Renewable and Sustainable Energy Reviews, Solar energy, Energy Conversion and Management, Energy, Applied Energy and others. My research work has been cited in highly reputed journals with over 130 non-self-citations by Scopus. I have also contributed through 17 conference papers, 17 technical reports, over 10 presentations and several research projects. I am also a Columnist in the Al-Eqtisadiyah newspaper by writing a weekly article about recent issues related to Renewable Energy. So far contributed with over 150 articles.

I obtained my doctorate from The Department of Mechanical Engineering, Texas A&M University, College Station, Texas, USA in 2004 under the supervision of Prof. N. K. Anand. My Dissertation topic was “Numerical Study of Fluid Flow and Heat Transfer over a Bank of Flat Tubes” which is extracted in the research paper J01. This was followed by employments at KFUPM, Dhahran {2004 to date} as faculty member.

6.3 University, Department and Public Service

Since I have joined KFUPM, in 2004, I have been involved in a large number of standing and ad-hoc committees. I have attended all the committee meetings and actively participated in the different activities and completion of tasks of the committees.

I have been associated with the student activities on both university and departmental level and I have chaired the **Student Affairs Committee** in ME Dep. for the year 2005/2006. As the Chairman of the committee, I have been involved in setting up the objectives, making strategies to achieve objectives and have been responsible for distribution and compilation of tasks. The committee has reviewed many student academic

files, and has made important contributions in setting academic guidelines and conducting a counseling session to each student with low academic performance. I participated in completion of all of these tasks. Once again, I have participated as a member in this committee for the year 2015/2016. In addition to the basic responsibilities of the committee, we were responsible of Reviewing Research papers submitted to the 7th Saudi Students Conference.

I am working very closely with my students to establish the best plan and to help them achieve the best GPA. I have worked as a member of group of Faculty who teach a new established course (*University Study Skills*) for new preparatory year students in the University. As member of "Program Development Committee" I contributed in the development of each of the proposed unit to be taught. My experience of teaching this course prepared me for presenting a large lecture about University Study Skills and how to live in foreign country for *SABIC* new students with international scholarships in Riyadh, summer of 2006. In the next summer of 2007 *SABIC* approach me again to present the same lecture for the new patch of students going abroad. So, I took the initiatives of having *SABIC* students to come here to Dhahran and prepared for them a one full week program with related beneficial topics that suits their situation. In the program, there were among the speakers H.E. the Rector of the University, a member of the Highest Justices Council, psychology specialist and more. *SABIC* approached us again in the next summer of 2008 to repeat the program.

Since I have joined KFUPM, in 2004, I have been involved in a large number of student activities. I have been appointed by the Vice Rector of Academic affairs as a member of the *Gifted Student Program* at KFUPM 2004/2005. I have been selected to be the Chairman of student affairs of "The fifth scientific summer meeting for Gifted Student" 20 June – 17 July 2005 and the Vice President of "The sixth scientific summer meeting for Gifted Student" 30 June – 29 July 2007. I have also been selected by the Dean of Students Affairs to join the organizing committee of the 20th visit for *GCC* students 2006.

Other important departmental committees where I have served include:

- Academic/Text Book Committee (2004/2005)
- Public Relation Committee (2005/2006)
- Teaching Assignments Committee (2005/2006)
- M.E. Graduate/Doctoral Committee (2006/2007)
- M.E Strategic Planning & Faculty Search Committee (2008/2009)

As the Chairman of *Continuing Education Committee* in ME Dep. for the year 2007/2008, I took many initiatives to promote and facilitate Industrial Relationship with my department. These include

- Ways of encouraging cooperation between the ME Department and the industrial sector in the Kingdom.
- Effective participation in informing industry about the ME Department scientific and technical capabilities
- Effective participation in identifying the needs of industry in the fields of mechanical engineering in order to guide the department in revising its academic programs

- Mechanisms of encouraging the industrial sector to participate in the educational and training programs of the ME Department.
- Means of establishing an effective communication between the department and its graduates and benefiting from their experiences.

Besides coordinating each of the above activity, I actively participated in completion of the tasks involved.

I have worked in the ME *New Curriculum* Committee and the *Strategic Planning & Faculty Search* Committee of the department. I have been engaged in the activities of reviewing large numbers of applicant's files. I am also coordinating the "Strategic Planning" group of the department as Coordinator of the group for the year 2008/2009. This is a department level committee and it is entrusted with tasks of proposing means & ways of

- Screening Process and Evaluation of applicants to ME Dep.,
- Increasing faculty recruitment in ME Dep.,
- Diversification of faculty background of ME Dep.

As a member of task force, I contributed in completion of all the above mentioned tasks.

I have worked as a member of "**Graduate Program and Admission Committee**" in the year 2014-2015. The committee were assigned to develop a comprehensive revision of the graduate program. The study contained complete revision of the MS and MES program with details about the structure of the courses and including PhD comprehensive exam regulations.

In 2010-2012 I was appointed in the Research Institute as Director for Center of Research Support and as the name imply my office was responsible to provide support and quality control to every stage of all client funded project during the execution. The service include marketing the centers capabilities, host the client, preparing and signing the contract, administration of all financial issues, submission of progress and final reports on time, and collecting the feedback from the clients.

In 2012-2014 I was appointed in the Research Institute as Director for Center of Research Excellence in Renewable Energy, King Fahd University of Petroleum & Minerals. As the Director I was responsible for the overall development of laboratories in the Center. We have successfully developed a state-of-the-art solar cells research laboratory equipped with the necessary tools to synthesize and characterize crystalline and thin film silicon solar cells, two outdoor Photovoltaic modules testing facilities at KFUPM campus and KFUPM beach, a Solar Powered Aqua-Ammonia Refrigeration and Air-Conditioning System of 7.5 KW capacity, energy storage & conversion research laboratory including fuel cells and electro-chemical reactor system for carbon dioxide reduction.

Currently, I am appointed in Dammam Community College as Assistant Dean. I am engaged in almost every single aspect of the college. Beside the daily activities, my focus goes to the NCAAA (National commission of Academic Accreditation and Assessment) of the academic program of the college. The major goals during my term in the Community College is managing the complete Self-Assessment Cycle of the academic program. The academic departments participating in the Self-Assessment are Safety Technology, Computer and Information Technology, Accounting, Marketing, Human Resources, and Supply Chain Management.

Appendix

Appendix A: Awards and Honours (Section 1.6)

Appendix B: Annual Evaluations at KFUPM (Section 1.7)

Appendix C: Courses Taught at KFUPM, Dhahran, Saudi Arabia (Section 2.1.1)

Appendix D: Participation in Workshops and Short Courses (Section 2.4)

Appendix E: Newspaper Articles (Section 3.1.6)

Appendix F: Conferences and Workshops Attended (Section 3.5)

Appendix G: TAMU invitation to Dr. Bahaidarah (section 3.6.1)

Appendix H: Citations Received by Others (Section 3.7)

Appendix I: Educational Consulting (Section 4.1.2)