RESUME

SYED M. ZUBAIR
Distinguished Professor
Mechanical Engineering Department
King Fahd University of Petroleum & Minerals
Dhahran 31261, SAUDI ARABIA.

Career Objective

Teaching and/or Research in the fields of Heat Transfer, Thermodynamics, Refrigeration/Air-Conditioning Systems, Thermal Desalination Technologies, and Energy Conservation

Education

* Ph.D., Georgia Institute of Technology, Atlanta, GA, 1985.
* M.Sc., Mechanical Engineering, KFUPM, Dhahran, Saudi Arabia, 1980.
* B.Sc., Mechanical Engineering, Engineering University, Lahore, Pakistan, 1978.

Number of Years' Service on Faculty: **28 Years**

		Year	*Rank*
*	Original appointment	1986	Assistant Professor
*	Advancement	1991	Associate Professor
*	Advancement	1999	Professor

Other Related Experience - Teaching, Industrial, etc.

* 1980-1981 Research Assistant in the Research Institute, KFUPM, Dhahran, Saudi Arabia.
* 1985-1986 Senior Research Engineer, Copeland Corporation, Sidney, OH.

Professional Affiliations

1. American Society of Mechanical Engineers (ASME).
2. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
3. Sigma Xi, The Scientific Research Society.

Editorial Work

1. Editorial Board Member, International Journal of Refrigeration, published by Elsevier for International Institute of Refrigeration.
2. Editorial Board Member, International Journal of Exergy

Honors and Awards

- Received Distinguished Teacher Award in the College of Engineering Sciences, King Fahd University of Petroleum & Minerals, academic year 1991-1992.

- Received Distinguished Researcher Award from the King Fahd University of Petroleum & Minerals, academic year 1992-1993.

- Received Distinguished Researcher Award from the King Fahd University of Petroleum & Minerals, academic year 1997-1998.

- Received Distinguished Teacher Award in the College of Engineering Sciences, King Fahd University of Petroleum & Minerals, academic year 2002-2003.

- Received Distinguished Researcher Award from the King Fahd University of Petroleum & Minerals, academic year 2005-2006.

- Received best Applied Research Project on **Electrical and Physical Properties of Soils in Saudi Arabia**, from GCC-CIGRE group - 1993.

Teaching and Research Experience

February 1999 - Present
Professor
Department of Mechanical Engineering
King Fahd University of Petroleum & Minerals (KFUPM)
Dhahran 31261, Saudi Arabia

August 1991 - January 1999
Associate Professor
Department of Mechanical Engineering
King Fahd University of Petroleum and Minerals (KFUPM)
Dhahran 31261, Saudi Arabia.

June 1986 - July 1991
Assistant Professor
Department of Mechanical Engineering and Research Institute
King Fahd University of Petroleum and Minerals (KFUPM)
Dhahran 31261, Saudi Arabia.

At KFUPM I have taught and developed several courses. Some of the graduate and undergraduate courses are:

1. Thermodynamics I (ME 203)
2. Thermodynamics II (ME 204)
3. Fluid Mechanics (ME 311)
4. Heat Transfer (ME 315)
5. Solar Energy Conversion (ME 439)
6. Refrigeration and Air Conditioning (ME 430)
7. Refrigeration (ME 430)
8. Air Conditioning (ME 431)
9. Design and Rating of Heat Exchangers (ME 437)
10. Advanced Thermodynamics (ME 531)
11. Conduction Heat Transfer (ME 534)
12. Solar Energy Utilization (ME 539)
13. Thermal Design of Heat Exchangers (ME 549)

In addition to teaching responsibilities I am actively involved in various research projects. A list of projects completed or currently active at KFUPM is described on pages 4-6.

August 1985 - May 1986
Senior Project Engineer - Research
Copeland Corporation, 1675 W. Campbell Road, Sidney, OH 45365.

At Copeland Corporation, as a lead-man, I completed the following projects supported by COPELAND CORPORATION:

1. Laboratory Experiments on Variable-Speed Refrigeration / Air-Conditioning Compressors.

2. Thermodynamics of Variable-Speed, Supermarket Refrigeration Systems: Analytical and Experimental Study.

I also participated, as a lead man at COPELAND, on a proposal requested by Electric Power Research Institute (EPRI-USA) on "*Supercharged Refrigeration Compressors.*" The project was awarded to Copeland Corporation.

July 1982 - August 1985 ***Graduate Student / Teaching Assistant***
School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA.

At Georgia Tech I actively participated in the ***Heat Pump Project***, supported by the School of Mechanical Engineering. In addition, I also taught the course entitled "ME 3323 Thermodynamics II"

January 1982 - June 1982 *Graduate Student / Research Assistant*
Energy Resources Center, The University of Tennessee, Knoxville, TN

At UT-Knoxville I evaluated computer programs to study ***Ground Coupled Heat Pump Systems***.

September 1978 - December 1981 *Graduate Student / Research Assistant*
King Fahd University of Petroleum and Minerals (KFUPM)
Dhahran 31261, Saudi Arabia

During this period at KFUPM, I taught the following courses:

1. ME 205 Material Science Lab
2. ME 301 Fluid Mechanics Lab
3. ME 430 Refrigeration & Air-Conditioning Lab

In addition to the (laboratory) teaching assignments I was also involved in the following (main) projects:

1. Operation of a Small-Scale, Salt-Gradient, Solar Pond (supported by RI/KFUPM)
2. Solar Cooling Project - Phase I (supported by SOLERAS/KACST)

Other Activities

- Worked as a **Lead Scientist** to help organize **7th World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics**, June 28-July 02, 2009, Krakow, Poland, (www.**exhft**-7.agh.edu.pl)

- Worked as a **Lead Scientist** to help organize **6th World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics**, April 17-21, 2005, Miyagi, Japan (http://pixy.ifs.tohoku.ac.jp/exhft6).

- Worked as a **Lead Scientist** to help organize **5th World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics**, September 24-28, 2001, Thessaloniki, Greece (http://www.ing.unipi.it/exhft5).

M.S & Ph.D. Theses

June 1980. "Modeling of a Solar Rankine Cycle Air Conditioning System with Different Storage Elements," M.Sc. Thesis, University of Petroleum and Minerals, Dhahran, Saudi Arabia.

September 1985 "Solar Assisted Heat Pump: A Thermoeconomic Design Based on Second-Law," Ph.D. Thesis, School of Mechanical Engineering, Georgia Institute of Technology, Atlanta, Georgia, U.S.A.

Research Projects Completed

- **Solar Cooling Project - Phase 1**. The project involved design, analysis, specification, and monitoring of Solar-Powered Rankine Cycle Air-Conditioning System. The project was funded by *SOLERAS/KACST* under the joint Saudi - U.S.A. Solar Energy Program. I worked as a co-investigator on design phase of the project.

- **Statistical Analysis of the Jubail Soil Data**. Research Institute, KFUPM, funded the project. Regression models were developed to predict the soil resistivity as a function of other soil parameters. I worked as a co-investigator on the project.

- **Laboratory Experiments on Variable-Speed Refrigeration / Air-Conditioning Compressors**. Copeland Corporation, U.S.A, funded this project. Experiments at Copeland facilities were conducted to study variable speed compressors for different applications in Refrigeration and Air-Conditioning Industries. The overall objective of the project was to improve the energy efficiency of these systems. I worked as a principal investigator on the project.

- **Thermodynamics of Variable-Speed, Supermarket Refrigeration Systems: Analytical and Experimental Study**. Copeland Corporation, U.S.A, funded this project. Several vapor-compression refrigeration systems were studied to explore the feasibility of variable-speed systems in a refrigeration industry with a view to provide improved performance and reliability. I worked as a principal investigator on the project.

- **Energy Conservation On the Campus of King Fahd University of Petroleum and Minerals**. Research Institute, KFUPM, funded this project. Energy conservation opportunities were identified and implemented in different parts of the campus that included academic areas, students and labor dormitories, and faculty and staff housing. My main task was in evaluating the operation and maintenance of (existing) refrigeration systems. I worked as a co- investigator on the project.

- **Capacity Control of Air Conditioning / Refrigeration Systems**. It was an independent research project initiated at Research Institute, KFUPM. Capacity-control schemes of various refrigeration and air-conditioning systems were examined from performance standpoint. I worked as a principal investigator on the project.

- **Thermodynamics of Regenerative-Reheat Rankine Cycle Power Plants**. It was an independent research project initiated at Mechanical Engineering Department, KFUPM. Second-law-based design and performance analysis was carried out for Steam Cycles that are commonly used in Steam-Based Power Plants. Important design parameters are identified to optimize the system performance. I worked as a co-investigator on the project.

- **Exergy Efficiency of Flat-Plate Thermal and Photovoltaic Solar Collectors**. Research Institute, KFUPM, funded this project. Second-law-based performance evaluation of solar collectors was carried out to identify the limitations of thermal and photovoltaic collectors for power production. I worked as a co-investigator on the project I worked as a co-investigator on the project.

- **Electrical and Physical Properties of Soils in Saudi Arabia**. This project was funded by KACST, a Saudi national organization. Thermal resistivity and stability data of different soil samples taken from various parts of Saudi Arabia were studied in situ as well as in Laboratory. The project has a direct relevance to the current-carrying capability of underground power cables. The local Power Company consulted has several times to update their standards based on the data generated in this project. I worked as a co-investigator on the project. The project has been awarded best *Applied Research Project* by GCC-CIGRE group in the year 1993.

- **On a Class of Incomplete Gamma Functions with Applications**. KFUPM Research Committee funded this project. Application of the functions to various heat-source problems that has direct application in the manufacturing industry was investigated. The outcome of this project is a research monograph that is published by CRC press, U.S.A. I worked as a co-investigator on the project.

- **A Maintenance Strategy for Heat Transfer Equipment Subject to Fouling**. KFUPM Research Committee funded the project. A probabilistic approach in characterizing the fouling data was investigated and its implications on maintenance of heat exchangers that are used in several energy-intensive industries were explained with respect to many example problems. I worked as a principal investigator on the project.

- **Second-Law Aspects of Thermal Systems Analysis and Design.** It was an independent research project that was initiated in the Mechanical Engineering Department, KFUPM with other faculty members. I worked as a principal investigator on the project.

- **Design and Performance Evaluation of Refrigeration / Air-Conditioning Systems**. It was an independent research project, which was initiated in the Mechanical Engineering Department, KFUPM. I worked as a principal investigator on the project.

M.S. Thesis Supervision

1. "Theoretical Investigation of Natural Convection from an Isothermal Elliptic Cylinder," M.S. Thesis of Mr. Khalid Shamsher, Mechanical Engineering Department, KFUPM, June 1990.
(as a committee member)

2. "Reliable Life Prediction Models for Various Material Damage Processes," M.S. Thesis of Mr. Shaik Mohammad Najeeb, Department of Mechanical Engineering, KFUPM, November 1990.
(as a co-advisor)

3. "Second-Law-Based Thermodynamic Analysis of Vapor-Compression Refrigeration Cycles," M.S. Thesis of Mr. Shamsul Hoda Khan, Department of Mechanical Engineering, KFUPM, January 1992.
(as an advisor)

4. "Experimental Determination of Heat Transfer Coefficient for Water-Lithium Bromide Mixture," M.S. Thesis of Mr. Hussain Abdullah Al-Bazroon, Department of Mechanical Engineering, KFUPM, January 1992.
(as a committee member)

5. "Numerical Simulation of Ice Crystal Growth (Initial Frosting Process)," M.S. Thesis of Mr. Eball Hifthy A. Ahmed, Department of Mechanical Engineering, KFUPM, February 1992.
(as a committee member)

6. "Control of Hypersonic Flight Trajectories to Minimize Heat Load," M.S. Thesis of Mr. S. S. A. K. Javeed Nizami, Department of Mechanical Engineering, KFUPM, June 1994.
(as a committee member)

7. "Mixed Convection from a Horizontal Cyclinder Rotating in a Cooling Cross-Stream," M.S. Thesis of Mr. Ali Abdul-Aziz Mohammad Shehata, Department of Mechanical Engineering, KFUPM, June 1994.
(as a committee member)

8. "Energy and Exergy Analysis of Ghazlan Power Plant," M.S. Thesis of Mr. Jamil Jarallah Awadh Al-Bagawi, Department of Mechanical Engineering, KFUPM, October 1994.
(as a committee member)

9. "Reliability Based Maintenance Strategies for Heat Exchangers Subject to Fouling," M.S. Thesis of Mr. Manzoor-ul-Haq, Department of Mechanical Engineering, KFUPM, April 1995.
(as an advisor)

10. "Three-Dimensional Transient Temperature Analysis of Friction Welding of Cylindrical Bars," M.S. Thesis of Mr. Shaik Ilias Ahamad, Department of Mechanical Engineering, KFUPM, April 1996.
(as a committee member)

11. "Hybrid Liquid Desiccant Based Air-Conditioning System," M.S. Thesis of Mr. C. S. Khalid Ahmed, Department of Mechanical Engineering, KFUPM, May 1996.
(as a committee member)

12. "Effect of Thermal-Hydraulic Parameters on $CaCO_3$ Scaling in Heat Exchangers," M.S. Thesis of Mr. M. Sultan Khan, Department of Mechanical Engineering, KFUPM, May 1996.
(as a co-advisor)

13. "Thermoeconomic Optimization of Thermal Energy Storage Systems," M.S. Thesis of Mr. Muammar Abdallah AL-Naglah, Department of Mechanical Engineering, KFUPM, June 1997.
(as an advisor)

14. "Design and Performance Evaluation of Refrigeration Systems Using Thermodynamic Models," M.S. Thesis of Mr. Jameel-ur-Rehman Khan, Department of Mechanical Engineering, KFUPM, November 1997.
(as an advisor)

15. "Performance Evaluation of Shell-and-Tube Heat Exchangers: A Numerical Approach," M.S. Thesis of Mr. Irfan Saif Hussaini, Department of Mechanical Engineering, KFUPM, December 1997.
(as a committee member)

16. "Design and Performance Evaluation of Evaporative Cooling Towers," M.S. Thesis of Mr. Haitham Bahaidrah, Department of Mechanical Engineering, KFUPM, May 1999.
(as an advisor)

17. "Conjugate Forced Convection Heat Transfer in Eccentric Annuli," M.S. Thesis of Mr. Saiyed Aijaz Haider, Department of Mechanical Engineering, KFUPM, May 1999.
(as a committee member)

18. "The Effect of Temperature Dependent Viscosity Variation on the Performance of Heat Exchangers," M.S. Thesis of Mr. Saleh M. Ba-Galagel, Department of Mechanical Engineering, KFUPM, June 2001.
(as a committee member)

19. "Thermo-Mechanical Modeling of Tool and Workpiece Interface in Metal Forming Processes," M.S. Thesis of Mr. Ovais U. Khan, Department of Mechanical Engineering, KFUPM, November 2002.
(as a committee member)

20. "Conjugate Free Convection Heat Transfer in Vertical Eccentric Annuli," M.S. Thesis of Mr. Ahmad Jamal, Department of Mechanical Engineering, KFUPM, December 2002.
(as a committee member)

21. "Energy and Exergy Analyses of Crude Oil Distillation Plants," M.S. Thesis of Mr. Husain Al-Muslim, Department of Mechanical Engineering, KFUPM, December 2002.
(as a committee member)

22. "Natural Convection Flow in Parallel Plate Vertical Channels," M.S. Thesis of Mr. Sohail Anwar, Department of Mechanical Engineering, KFUPM, December 2003.
(as a committee member)

23. "Transient Impulsive Flow About a Sphere in a Gas Stream," M.S. Thesis of Mr. Fayez H.M. Al-Ghamdi, Department of Mechanical Engineering, KFUPM, March 2004.
(as a committee member)

24 "Design, Rating and Exergy Analysis of Evaporative Heat Exchangers," M.S. Thesis of Mr. Bilal A. Qureshi, Department of Mechanical Engineering, KFUPM, April 2004.
(as an advisor)

25 "Entropy Generation Around a Solid Sphere in a Gas Stream," M.S. Thesis of Mr. Mohammad Gayazullah, Department of Mechanical Engineering, KFUPM, December 2004.
(as a committee member)

26 "Effect of Outflow Orientation on Heat Transfer in a Rectangular Channel with a Single Array of Impinging Jets," M.S. Thesis of Mr. Mohammed Khaleel, Department of Mechanical Engineering, KFUPM, March 2005.
(as a committee member)

27 "The Impact of HVAC Systems Selection and Operation on Energy Conservation in an Office Building in a Hot and Humid Climates of Saudi Arabia," M.S. Thesis of Mr. Imran Iqbal, Department of Architectural Engineering, KFUPM, May 2005.
(as a committee member)

28 "Laminar Mixed Convection in Vertical Channels," M.S. Thesis of Mr. Shaik Samivullah, Department of Mechanical Engineering, KFUPM, May 2005.

(as a committee member)

29 "Parametric Study of Heat Transfer Characteristics in a Quadrangular Channel with Inclined Target Surface," M.S. Thesis of Mr. Ali Abdullah Al-Mubarak, Department of Mechanical Engineering, KFUPM, March 2007.

(as a committee member)

30 "Design and Operate a Fouling Monitoring Device to Study Fouling in Twisted Tubes," M.S. Thesis of Mr. Abdullah Al-Qahtani, Department of Mechanical Engineering, KFUPM, May 2008.

(as a committee member)

31 "Thermal Analysis and Optimization of Annular Fins with Simultaneous Heat and Mass Transfer," M.S. Thesis of Mr. Abdurrahman Moinuddin, Department of Mechanical Engineering, KFUPM, June 2009.

(as an advisor)

32 "Performance Analysis of Chilled Water Systems and the Effect of Incorporation of Ejector Cooling System," M.S. Thesis of Mr. Syed Ammar Trimizi, Department of Mechanical Engineering, KFUPM, June 2010

(as a committee member)

33 "Performance Characteristics of Solar Air Heated HDH Desalination Systems," M..S. Thesis of Mr. Islam Abdulhafez Shabaneh, Department of Mechanical Engineering, KFUPM, January 2011

(as a committee member)

34 Performance Evaluation of Seawater Counter Flow Cooling Towers," M.S. Thesis of Mr. Iqbal Hussain, Department of Mechanical Engineering, KFUPM, May 2011

(as an advisor)

Ph.D. Thesis Supervision

1. "Mixed Convection from an Elliptic Tube Placed in a Fluctuating Free Stream," Ph.D. Thesis of Mr. Eball Hifthy A. Ahmed, Department of Mechanical Engineering, KFUPM, December 1996.

(as a committee member)

2. "Simulation of Three-Dimensional Laser Gas-Assisted Heating of Solid Substance: The Fourier Heat Conduction Theory Approach," Ph.D. Thesis of Mr. Shahzada Zaman Shuja, Department of Mechanical Engineering, KFUPM, June 1998.

(as a committee member)

3. "Heat Convection from a Cylinder Performing Linear and Rotational Oscillations," Ph.D. Thesis of Mr. Fathi M. Mahfouz, Department of Mechanical Engineering, KFUPM, June 1998.

(as a committee member)

4. "Fouling Analysis and its Mitigation in Heat Exchangers," Ph.D. Thesis of Mr. Jamil J.A. Al-Bagawi, Department of Mechanical Engineering, KFUPM, June 2002.

(as a co-advisor)

5. "Various Mathematical Properties of The Generalized Incomplete Gamma Functions with Applications," Ph.D. Thesis of Mr. Bader Ahmed Al-Humaidi, Department of Mathematical Sciences, KFUPM, May 2011.

(as a co-advisor)

BOOKS or RESEARCH MONOGRAPHS

(1) I. Dincer, **S.M. Zubair**, and A. A. Al-Farayedhi, Proceedings of the Workshop on Energy Conservation in Industrial Applications – WEC' 2000, KFUPM press, Saudi Arabia, pages 431 (2000)

(2) M. A. Chaudhry, and **S.M. Zubair**, On a Class of Incomplete Gamma Functions with Applications, CRC Press, Boca Raton, FL, U.S.A., xiv + 493 pp. ISBN: 1-58488-143-7 (2002)

(Available from www.amazon.com; some of the reviewers indicated the following)

★★★★★ **A book of great use.**, December 23, 2005
Reviewer: **NJ reader** - See all my reviews
This book presents a thorough well written description of some very useful mathematical functions that are not available elsewhere except is numerous journal articles. The new functions presented in this book arise naturally out of some important problems in mathematical modeling. The book is extremely helpful in my work. In addition, it is well written and provides connections between the new functions presented and standard special functions. I expect that these function will become standard functions themselves given their usefulness in applications.

★★★★★ **Special function review**, August 31, 2004
Reviewer: **Lorenz H. Menke, Jr.** (Philadelphia PA) - See all my reviews
REAL NAME™
A book that special function researchers should have. Very clear and usable definitions with generalized extensions to many of the common special functions along with a good set of examples and applications. One would have to search many journals going back decades to collect the information presented as exemplified by the 331 references.

RESEARCH PUBLICATIONS

Papers in Refereed Journals

(1) B. Nimmo, and **S. Zubair**, "Force Convection Heat Transfer at an Inclined and Yawed Square plate - Application to Solar Collectors," "Local Heat Transfer and Fluid Flow Characteristics for Air Flow Oblique or Normal to Square Plate," and "Effect of Finite Width on Heat Transfer and Fluid Flow about an Inclined Rectangular Plate," Discussion, *Transactions of ASME, Journal of Heat Transfer*, Vol. 103(4), pp. 824-825 (1981)

(2) M.O. Nazer, and **S.M. Zubair**, "Analysis of a Rankine Cycle Air-Conditioning System," *ASHRAE Transactions*, Vol. 88(2), pp. 332-345 (1982)

(3) M.A. Elhadidy, B.G. Nimmo, and **S. Zubair**, "Operation of a Small-Scale Salt-Gradient Solar Pond: Experimental Results," *Transactions of ASME, Journal of Solar Energy Engineering*, Vol. 108(1), pp. 55-59 (1986)

(4) **S.M. Zubair**, P.V. Kadaba, and R.B. Evans, "Second-Law-Based Thermoeconomic Optimization of Two-Phase Heat Exchangers," *Transactions of ASME, Journal of Heat Transfer*, Vol. 109(2), pp. 287-294 (1987)

(5) V. Bahel, H. Bakhsh, and **S. Zubair**, "Performance Degradation of An Air-Conditioner Caused By Cyclic Operations," *Energy - The International Journal*, Vol. 13(2), pp. 191-195 (1988)

(6) V. Bahel, and **S.M. Zubair**, "Mechanical Subcooling Improves Supermarket

Refrigeration Performance," *Heating Piping Air Conditioning*, Vol. 60(2), pp. 105-107 (1988)

(7) **S.M. Zubair**, and V. Bahel, "Compressor Capacity Modulation Scheme," *Heating Piping Air Conditioning*, Vol. 61(1), pp. 135-143 (1989)

(8) **S. Zubair**, V. Bahel, and M. Arshad, "Capacity Control of Air-Conditioning Systems By Power Inverters," *Energy - The International Journal*, Vol. 14(3), pp. 141-151 (1989)

(9) **S.M. Zubair**, V. Bahel, and D.Y. Abdel-Nabi, and M.A. Abdelrahman, "A Case Study for Improving Performance and Life Expectancy of Air-Conditioning Systems at a University Campus," *ASHRAE Transactions,* Vol. 95(1), pp. 349-354 (1989)

(10) V. Bahel, and **S.M. Zubair**, "An Assessment of Inverter-Driven Variable-Speed Air-Conditioners: Sample Performance Comparison with a Conventional System," *ASHRAE Transactions,* Vol. 95(1), pp. 455-464 (1989)

(11) V. Bahel, **S.M. Zubair**, and M.A. Abdelrahman, "Estimation of the Seasonal Cyclic Losses of an Air-Conditioner," ASHRAE Transactions, Vol. 95(1), pp. 434-440 (1989)

(12) **S.M. Zubair**, "Improvement of Refrigeration / Air Conditioning Performance With Mechanical Subcooling," *Energy - The International Journal*, Vol. 15(5), pp. 427-433 (1990)

(13) **S.M. Zubair**, and P.V. Kadaba, "Similarity Transformations for Boundary Layer Equations in Unsteady Mixed Convection," *International Communications in Heat and Mass Trasfer*, Vol. 17(3), pp. 215-226 (1990)

(14) D.Y. Abdel-Nabi, **S.M. Zubair**, M.A. Abdelrahman, and V. Bahel, "Regression Analysis of a Residential Air Conditioning Energy Consumption in Dhahran, Saudi Arabia," *ASHRAE Transactions*, Vol. 96(2), pp. 223-232 (1990)

(15) **S.M. Zubair**, and K. Shamsher, "Conduction of Heat across Rectangular-Partitioned Enclosures: An Analytical Solution," *International Communications in Heat and Mass Transfer*, Vol. 18(4), 509-521 (1991)

(16) **S.M. Zubair**, and M.A. Chaudhry, "Temperature Solutions due to Continuously Operating Spherical-Surface-Heat Sources in an Infinite Medium," *International Communications in Heat and Mass Transfer*, 18(6), 805-811 (1991)

(17) **S.M. Zubair**, and M.A. Chaudhry, "An Analytical Study of Transient Heat Conduction in an Infinite Medium with Gamma-Type, Spherical-Surface-Heat Sources," *International Communications in Heat and Mass Transfer*, Vol. 19(2), pp. 155-163 (1992)

(18) M.A. Habib, and **S.M. Zubair**, "Second-Law-Based Thermodynamic Analysis of Regenerative-Reheat Rankine Cycle Power Plants," *Energy - The International Journal*, Vol 17(3) pp. 295-301 (1992)

(19) M.A. Chaudhry, and **S.M. Zubair**, "Remarks on the Whittaker Functions,"

Applied Mathematics Letters, Vol. 5(5), pp. 25-29 (1992)

(20) **S.M. Zubair**, A.K. Sheikh, and M.N. Shaik, "A Probabilistic Approach to the Maintenance of Heat-Transfer Equipment Subject to Fouling," *Energy - The International Journal*, Vol. 17(8), pp. 769-776 (1992)

(21) **S.M. Zubair**, and M.A. Chaudhry, "Temperature Solutions due to Steady and Non-Steady Periodic-Type, Point Heat Sources in an Infinite Medium," *International Communications in Heat and Mass Transfer*, Vol. 19(5), pp. 651-660 (1992)

(22) M.A. Chaudhry, and **S.M. Zubair**, "Two Integrals Arising in Generalized Inverse Gaussian Model and Heat Conduction Problems," *SIAM Review*, Vol. 34(3) pp. 498 (1992).

(23) S.A.M. Said, and **S.M. Zubair**, "On Second-Law Efficiency of Solar Collectors," *Transactions of ASME, Journal of Solar Energy Engineering*, Vol. 115(1), pp. 2-4 (1993)

(24) **S.M. Zubair**, and M.A. Chaudhry, "Some Analytical Solutions of Time-Dependent, Continuously Operating Heat Sources," *Heat and Mass Transfer*, Vol. 28(4), pp. 217-224 (1993)

(25) M.A. Chaudhry, and **S.M. Zubair,** "Analytic Study of Temperature Solutions due to Gamma-Type Moving Point-Heat Sources," *International Journal of Heat and Mass Transfer*, Vol. 36(6), pp. 1633-1637 (1993)

(26) M.A. Badar, **S.M. Zubair**, and A.A. Al-Farayedhi, "Second-Law-Based Thermoeconomic Optimization of a Sensible Heat Thermal Energy Storage System," *Energy - The International Journal*, Vol. 18(6), pp. 641-649 (1993)

(27) S.H. Khan, and **S.M. Zubair**, "Thermodynamic Analysis of the CFC-12 and HFC-134a Refrigeration Cycles," *Energy - The International Journal*, Vol. 18(7), pp. 717-724 (1993)

(28) M.A. Badar, **S.M. Zubair**, and A.K. Sheikh, "Uncertainty Analysis of Heat Exchanger Thermal Design Using The Monte Carlo Simulation Technique," *Energy - The International Journal*, Vol. 18(8), pp. 859-866 (1993)

(29) **S.M. Zubair**, and M.A. Chaudhry, "Heat Conduction in a Semi-Infinite Solid Subject to Time Dependent Surface Heat Fluxes: An Analytical Study," *Heat and Mass Transfer*, Vol. 28(6), pp. 357-364 (1993)

(30) **S.M. Zubair**, and M.A. Chaudhry, "Heat Conduction in a Semi-Infinite Solid When Subjected to a Spatially Decaying Instantaneous Laser Source," *Heat and Mass Transfer*, Vol. 28(7), pp. 425-431 (1993)

(31) M.A. Chaudhry, and **S.M. Zubair,** "Temperature and Heat Flux solutions due to Steady and Non-Steady Periodic-Type Surface Temperatures in a Semi-Infinite Solid," *Heat and Mass Transfer*, Vol. 29(4), pp. 205-210 (1994)

(32) M.A. Chaudhry, and **S.M. Zubair,** "Generalized Incomplete Gamma Functions with Applications," *Journal of Computational and Applied Mathematics*, Vol.

55(1), pp. 99-124 (1994)

(33) M.A. Chaudhry, and **S.M. Zubair**, "Laplace Transform Involving the MacDonald Function," *SIAM Review*, Vol. 36(3) pp. 489 (1994)

(34) **S.M. Zubair**, and M.A. Chaudhry, "Conduction of Heat in a Semi-Infinite Solid with an Exponential-Type Initial Temperature Profile: Temperature and Heat Flux Solutions Due to an Instantaneous Laser Source," *Heat and Mass Transfer,* Vol. 30(1), pp. 41-46 (1994)

(35) **S.M. Zubair**, and M.A. Chaudhry, "Temperature Solutions due to Steady, Periodic-Type, Moving-Point-Heat Sources in an Infinite Medium," *International Communications in Heat and Mass Transfer,* Vol. 21(2), pp. 207-215 (1994)

(36) M.A. Chaudhry, and **S.M. Zubair,** "On a Pair of Functions Useful in Heat Conduction Problems," *International Communications in Heat and Mass Transfer,* Vol. 21(5), pp. 673-681 (1994)

(37) **S.M. Zubair**, "Thermodynamics of a Vapor-Compression Refrigeration Cycle with Mechanical Subcooling," *Energy - The International Journal*, Vol. 19(6), pp. 707-715 (1994)

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