

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF FLORIDA

ANDREA ROSSI and LEONARDO
CORPORATION,

Plaintiffs,

v.

THOMAS DARDEN; JOHN T. VAUGHN,
INDUSTRIAL HEAT, LLC; IPH
INTERNATIONAL B.V.; and
CHEROKEE INVESTMENT PARTNERS,
LLC,

Defendants.

CASE NO. 1:16-cv-21199-CMA

**EXPERT DISCLOSURE OF PROF.
DR. KAUFUI V. WONG**

INDUSTRIAL HEAT, LLC and IPH
INTERNATIONAL B.V.,

Counter-Plaintiffs,

v.

ANDREA ROSSI and LEONARDO
CORPORATION,

Counter-Defendants,

and

J.M. PRODUCTS, INC.; HENRY
JOHNSON; FABIO PENON; UNITED
STATES QUANTUM LEAP, LLC;
FULVIO FABIANI; and JAMES BASS,

Third-Party Defendants.

EXPERT DISCLOSURE OF PROF. DR. KAUFUI V. WONG

Plaintiffs ANDREA ROSSI, and LEONARDO CORPORATION, (collectively, “Plaintiffs”), pursuant to Fed. R. Civ. P. 26(a)(2)(B), hereby submit the expert disclosure of Prof. Dr. Kaufui V. Wong:

Prof. Dr. Kaufui V. Wong, Professor of Mechanical and Aerospace Engineering, University of Miami, shall be testifying as to his opinions concerning the heat dissipation facilities designed and provided for the E-Cat plant, and rebutting the accuracy and reliability of the reports by Mr. Murray and Mr. Smith.

SECTION 1 - GENERAL

1.1 PURPOSE

- To evaluate existing conditions, photographs, documentation, and authorities on thermodynamics to determine the feasibility of dissipation of 1MW of heat energy at the facility located at 7861 N.W. 46th Street, Doral, Florida (“Doral Facility”).
- To evaluate the propriety and accuracy of the opinions rendered by Mr. Joseph A. Murray as contained in Expert Disclosure of Joseph A. Murray.
- To evaluate the propriety and accuracy of the opinions rendered by Mr. Rick A. Smith, P.E. as contained in Expert Report of Rick A. Smith, P.E.

1.2 BACKGROUND

Leonardo Corporation is a company that purports to have invented or designed manufacturing plants and machinery for the production of energy from non-conventional sources. Leonardo Corporation refers to its energy plant as an Energy Catalyzer or E-Cat. Leonardo Corporation refers to its technology as deriving from “LENR” or Low Energy Nuclear Reactions. This expert has not been asked to opine, nor will he opine, as to the nature of the reaction underlying the E-Cat technology or whether such reaction is in fact occurring. Leonardo Corporation claims to have operated a 1MW E-Cat plant at the Doral Facility for a period in excess of 350 days while supplying the steam generated by the plant to another business located within the Doral Facility.

On January 30, 2017, Mr. Joseph Murray rendered an Expert Disclosure in which Mr. Murray opines that:

- “[T]here is no logical reason why the COP should be changing inversely to the amount of power imputed [sic] given that the same E-cat plant was used throughout the ‘guaranteed performance test’”; and
- That given the conditions at the Doral Facility, the supply of 500 kw to 800 kw of heat would have rendered the Doral Facility “unsuited for a human working environment.”

Also on January 30, 2017, Mr. Rick A. Smith rendered his Expert Report in which Mr. Smith opines that:

- “The Penon reports, standing alone, are not valid to tabulate and compute the performance of the E-Cat. The data are suspect and the methodology is not explained,” based upon Penon’s use of COP to calculate the performance of the E-Cat; and
- “The E-Cat never produced the energy which was claimed for it. This energy had to be rejected somewhere, and this analysis has shown, by the process of elimination, that the claimed energy never existed.”

1.3 METHODOLOGY

This expert undertook a site visit to the Doral Facility, in order to take measurements of the Doral Facility, interview Dr. Rossi with respect to the heat exchanger utilized during the operation of the E-Cat plant, view the sources for ventilation of heat from the Doral Facility, and determine whether the heat exchanger described by Dr. Rossi would have been sufficient to disburse 1MW of heat from the Doral Facility. In addition to these sources of facts and information, Prof. Dr. Wong has reviewed the following in developing his conclusions and opinions:

1. The Penon Report;
2. The Expert Disclosure of Joseph A. Murray;
3. The Expert Report of Rick A. Smith, P.E.;
4. Wong, KV, *Thermodynamics for Engineers*, 2nd Ed. CRC Press, 2000, 370 pp, TJ265.W56, 2012;
5. Wong, KV, *Thermodynamics for Engineers II*, 9th Ed., U.M., 2014.
6. Kakac, Liu and Pramuanjaroenkij, *Heat Exchangers*, 2nd Ed. CRC Press, Boca Raton, FL, USA, 2002.
7. Photographs of the Doral Facility, appended hereto as **Composite Exhibit A**.

SECTION 2—OPINIONS OF PROF. DR. WONG

Based on the information I have been provided, the conditions that I have observed and my measurements taken at the Doral Facility, my opinions are:

- The Coefficient of Performance is a criterion that is suitable to determine the way the E-Cat plant functions.
- There are clear and logical explanations for an inverse relationship between the amount of power input into a device and the COP of that device. In fact, not only are such explanations logical, they should be expected from the way the E-Cat plant was operated.
- Under the conditions described at the Doral Facility, it was more than possible to expel 1MW of heat energy without rendering the Doral Facility “unsuited for a human working environment.”
- Under the conditions observed and described at the Doral Facility, it was more than possible to expel 1MW heat energy from the Doral Facility consistent with the amount of energy reported in Dr. Penon’s report.

2.1 SITE CONDITIONS

Informed:

- This expert has been informed that a heat exchanger was located in the second floor room at the Doral Facility. The specifications of the heat exchanger have been described to me as follows:
 - Composition: (22) steel pipes
 - Length: 10 meters each (excluding u-shaped connector);
 - Interior Diameter: .15 meter
 - Total surface Area: approx. 103 sq. m. (1,030,000 sq. cm.) (does not include pipe overlapping or u-joints)
 - Encasement: wood panel insulated with rock wool shaped for thermal and acoustic insulation
 - Dimensions: Aprox. 10 m (length) X 6.5 m (width) X 1 m (height)
 - Air Flow: 2 Fans (25,000 cubic m/hr. each)

Site Observations:

- Two large air vents in ceiling in the main warehouse area at Doral Facility

- Large loading bay doors at one end of the Doral Facility
- Two large ventilation fans in main warehouse area
- 2nd Floor heat exchanger area with three bays of windows accessible for ventilation.

2.2 RELATIONSHIP BETWEEN ELECTRICAL INPUT AND “COP”

Commentary:

The equation to determine COP for a heat pump is:

$$\text{COP} = (\text{Energy Output}) / (\text{Energy Input})$$

In his Expert Disclosure, Mr. Murray takes issue with the fact that on several occasions during the period recorded by Dr. Penon, there existed an inverse relationship between the COP and the amount of energy input. In fact, Mr. Murray goes to the extent to claim that “there is no logical reason why the COP should be changing inversely to the amount of power input.” This statement is fallacious.

In the COP equation above, the energy input (i.e. the electrical energy measured by Dr. Penon) is the input power supplied by FPL. If the energy output (numerator) of the plant is approximately constant, the equation dictates that the COP of the E-Cat will increase when the plant draws less electrical power (denominator decreases). Accordingly, the data collected by Dr. Penon is consistent with this basic equation.

Conclusion:

The use of the Coefficient of Performance is justified for the E-Cat.

2.3 SUITABILITY OF WORK CONDITIONS DUE TO HEAT ENERGY GENERATED

Commentary:

From Mr. Murray’s opinion:

“Mr. Murray will testify as to the heat simulations he ran to recreate the thermal conditions inside the Doral location. The thermal simulation involved a 500 kw or 800 kw power source uniformly distributed in a container at the Doral location, 7861 NW 46th Street, Doral, FL 33166 and releasing heat into the ambient warehouse of the Doral location. Mr. Murray’s simulation demonstrates how the heat would typically build over time to achieve a steady state temperature. See ‘Thermal Simulations.’ This means that the room would have been heated to a temperature unsuited for a human working environment.”

Conclusions:

1. Starting from the reactor/generator of the E-Cat plant, heat could have dissipated from the energy source (however well insulated);
2. Next, heat could have been dissipated through the pipes which led from the E-Cat plant to the heat exchanger (room);
3. Workmen who were working in the room could be called to testify that the room in which they were working felt significantly warmer when the E-Cat plant was working and generating energy;
4. Heat dissipated by these transmission pipes could be lost easily to the large space, aided by the ventilation fans.
5. Finally, heat was dissipated in the heat exchanger specially designed by Dr. Rossi. The heat that could be dissipated by this heat exchanger is at least 1MW.

Mr. Murray did not see or mention the heat exchanger which was designed and built to dissipate the energy generated by the E-Cat plant. Neither did Mr. Smith consider the heat exchanger in rendering his opinion. As described above, a substantial heat exchanger was constructed within the Doral Facility which would have greatly affected the dissipation of heat within the Doral Facility.

Although this expert did not observe the heat exchanger during his site visit (it had been removed after the conclusion of the E-Cat test), Dr. Rossi described in detail the form, function and specifications of the heat exchanger located on the second floor of the Doral Facility. According to Dr. Rossi, the heat exchanger was comprised of a series of steel pipes supported by a wood frame which were contained within an insulated wood structure. Within the wooden structure, two fans (each 25,000 cubic meters/hour) circulated the air over the steel pipes with the air exiting through a 3.8 square meters opening on the front of the building (consistent with the windows observed by this expert). Based upon Dr. Rossi's description of the heat exchanger placed at a second floor level, with 2 fans of combined capacity of 50,000 cubic meters/hour, this expert is satisfied that the heat exchanger answers the question as to where the heat energy was dissipated.

Mr. Murray's statement that "the room would have been heated to a temperature unsuited for a human working environment" is fallacious.

To roughly calculate the amount of heat energy which can be dissipated through the described heat exchanger (conductivity), we apply the Fourier Equation which is:

$$Q = k \times A \times [(T_c - T_f) \div (L)] \quad \text{Equation 1}$$

In this equation:

Q = heat transfer from steam/water to steel pipes. The steel pipes participate fully in the heat transfer.

k = Specific Thermal Conductivity of the C 15 steel (36 W/m° C)

A = Surface Area in meters squared (100m²)

L = Thickness of the pipe wall in meters (1.5mm).

T_c = Temperature of heat from source in Celsius (101° C)

T_f = Temperature of water outflow in Celsius (99-100° C)

m_w = Flow rate of water (1500 kg/hr)

The latent heat of steam at standard temperature and pressure ("STP") is 2257 kJ/kg. *See Engineer's Toolbox.* The amount of heat to be rejected by the steam and water is 0.94 MW.

2.4 AIR FLOW CONSIDERATIONS

The air flow inside the heat exchanger was 50,000 m³/hr with the heat exchanger's volume of 60 cubic meters, the air inside the heat exchanger was changed 833 time per hour.

Newton's law of cooling is used for calculating the heat extraction from the heat exchanger by the forced convection induced by the two fans.

As per Newton's Law of Cooling:

$$Q = hA\Delta T \quad \text{Equation 2}$$

In this equation:

Q = heat transfer from steel pipes to air.

h = overall heat transmission coefficient between moderate air cross flow and carbon 1.5 steel. *See [OPPO Conductibita Termica].* The value is 200 W/m²C.

A = area of heat transfer (100m²)

$\Delta T = T_f - T_c$.

T_c = outer surface temperature of steel pipes (100° C).

T_f = ambient air temperature (30° C).

Heat Convection Area is 100m².

Therefore: $Q = 1.4 \text{ MW}$.

Applying the two equations described above to the conditions and specifications existing at the Doral Facility, this expert was able to determine that the described heat exchanger would have been more than sufficient to expel in excess of 1MW of heat energy from the Doral Facility.

Conclusion:

This expert has concluded that, assuming the existence of the heat exchanger with the specifications above, the heat exchanger and the fans are capable of removing at least 1 MW of heat energy from the Doral Facility. Additionally, the energy generated by the E-Cat plant was dissipated around the E-Cat plant itself, the transmission pipelines to the heat exchanger, and in the heat exchanger itself which was cooled by two motorized fans. "That the room would have been heated to a temperature unsuited for a human working environment" concluded by Mr. Murray, is simply fallacious.

SECTION 3—SUPPORTING EXHIBITS

- **Exhibit A-1** shows the heat exchanger room, where the steel pipes of the heat exchanger were placed in a horizontal array on the floor of the room.
- **Exhibit A-2** shows the framework, delineating four holes in the outer wall of the heat exchanger room.
- **Exhibit A-3** shows the only door connecting the second-floor heat exchanger room to the much bigger space where there were workmen. The dimensions of the door are one foot and ten inches wide by six feet and eight inches wide.
- **Exhibit A-4** shows two ventilation fans in the larger space adjacent to the heat exchanger room where workmen were present during work hours.

SECTION 4—QUALIFICATIONS

A summary of my qualifications is provided in the CV appended hereto as **Exhibit B**, which includes a list of all publications I have authored in the previous ten years.

SECTION 5—PRIOR TESTIMONY

I have not provided testimony within the last four years.

SECTION 6—FEE DISCLOSURE

I am being compensated for my work in these proceedings at a rate of \$275.00 per hour, except that my rate for deposition and trial testimony is \$375.00 per hour. My compensation is not dependent on the opinions rendered or the outcome of this proceeding.

By: Wing Kaut
Prof. Dr. Kaufui V. Wong

Date: 2/13/17

Dated: February 13, 2017.

Respectfully submitted,

/s/ John W. Annesser, Esquire

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Leonardo Corporation*

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served by in the manner specified below on February 13, 2017 on all counsel or parties of record on the attached Service List.

/s/John W. Annesser, Esquire

John W. Annesser, Esquire

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COMPOSITE EXHIBIT A

EXHIBIT A-1



EXHIBIT A-2



EXHIBIT A-3



EXHIBIT A-4



EXHIBIT B

CURRICULUM VITAE

1. Date: February 7, 2017

PERSONAL

2. Name: **Kau-Fui Vincent Wong**
3. Home Phone: **(305) 553-0928**
4. Home Address: **8215 S. W. 48th Street
Miami, Florida 33155**
6. Current Academic Rank: **Professor, tenured**

HIGHER EDUCATION

7. **Institutional:**
B.S.(Honors) **University of Malaya**
Mechanical Engineering, June 1973
M.S. **Case Western Reserve University**
Mechanical Engineering, June 1975
Ph.D. **Case Western Reserve University**
Mechanical & Aerospace Engineering
January 1977
8. **Certification, Licensure:**
Currently Registered Professional Engineer (Florida), since 1983.

EXPERIENCE

9. **Academic:**
- (a) 1979 to present: Professor, U.M.
 - (b) May 1990 to June 1995: Associate Director, Florida Center for Solid & Hazardous Waste Management.
 - (c) June 1990 to May 1993: Chairman of Graduate Studies, Mechanical Engineering Department.
 - (d) Sep., 1991: Taught a 3-day Seminar on Air Pollution, on the invitation of the Jamaica Institute of Engineers.
 - (e) April 1992 to 1995: Program Manager of the Florida Center State Oil Spill Research Initiative.
 - (f) June & Dec '96 (parts of month): Acting Department Chairman
 - (g) Jan. 1997 to Dec. 1997: Acting Department Associate Chairman
 - (h) 1999 to 2001: ABET EC accreditation Chairman for M.E.
 - (i) March-April 2004: Completed 8-week course on Leadership, U.Miami.
 - (m) March 2005: ASME Leadership Workshop, Pittsburgh.
 - (n) March 2006: ASME Leadership Workshop, Houston.
 - (o) March 2008: ASME Advanced Leadership Workshop, Atlanta.
10. **Non-Academic:**
- (a) May 1970 to Jan.1973: Nat. Elect. Board Scholar at the University of Malaya.

- Training in a 60 MW power station, Dec '71 to April '72.
- (b) Feb.1973 to Aug.1973: ASSISTANT ENGINEER WITH THE NATIONAL ELECTRICITY BOARD, MALAYSIA. Training in the various sections of a 170 MW power station: mechanical maintenance, workshop, electrical maintenance, instruments, operations, chemical laboratory, participated in the commissioning of a 60 MW generating unit.
 - (c) Sep. 1973 to Oct. 1976: RESEARCH ASSISTANT, CASE WESTERN RESERVE UNIVERSITY, CLEVELAND, OHIO 44106, U.S.A. Practical work in the area of heat transfer studies. Working knowledge of instrumentation and equipment used in temperature and flow measurements. Exposed to the latest techniques employed in heat and flow transfer, fluid flow studies and related fields, eg. computer based data acquisition. Experience in the treatment of heat transfer and fluid mechanical problems by using analytical and computational methods. Experience in computer programming and the use of the following computers: IBM 11/30, IBM 360, PDP 11/40 and UNIVAC 1106, 1108. Working knowledge of Basic, Fortran V.
 - (d) Dec.1976 to Feb.1979: RESEARCH ENGINEER/GENERATION PLANNING ENGINEER WITH NAT. ELECT. BOARD, MALAYSIA. Trouble-shooting of mechanical and chemically related problems in the various thermal power plants throughout peninsular Malaysia. Experience in conducting surveys for the metrication of measuring equipment used by the entire organization. Planning for 120 MW oil-fired boilers to be built in thermal power stations. Experience in the approval of drawing plans and testing/commissioning procedures. Experience in the design of the air-conditioning and ventilating system, and the fire protection system for a thermal power station.

PUBLICATIONS

15. Books and Monographs Published:

- (1) Co-Editor: Resource Recovery from Solid Wastes, Pergamon Press, 1982.
- (2) Editor: Proceedings of Waste-to-Energy Workshop, Tallahassee, FL, May 1991
- (3) Author: Thermodynamics for Engineers, CRC Press, 2000, 370 pp, TJ265.W56; 2nd Ed. 2012.
- (4) Author: Travels in the New Millennium, K.V.Wong, 2001, 140 leaves, Col. Ill., PS3573.O579T7.
- (5) Author: Florida Muse, K.V.Wong, 2001, 103 leaves, Col. Ill., PS3573.O579F5.
- (6) Author: Gems from the Trenches, K.V.Wong, 2002, Col. Ill., PS3573.O579W5.
- (7) Author: Intermediate Heat Transfer, Marcel Dekker, N.Y., 2003, 411 pp.
- (8) Author: Thermodynamics for Engineers II, 1st Ed, Xanadu, N.Y., 2003, 316 pp.
- (9) Author: Thermodynamics for Engineers II, 2nd Ed, Xanadu, N.Y., 2004, 314 pp
- (10) Author: Thermo. for Engineers II, 3rd Ed, Linus Pub., N.Y., 2007, 346 pp.
- (11) Author: Thermo. for Engineers II, 4th Ed, U.M., 2009, 297 pp.
- (12) Author: Thermo. For Engineers II, 9th Ed, U.M., 2014.
- (13) Editor: Essays in Energy, Momentum Press, NYC, 2015.
- (14) Author: Climate Change, Momentum Press, NYC, 2016.
- (15) Author: Sustainable Engineering, Momentum Press, NYC, 2016.

16. Juried or Refereed Journal Articles and Exhibitions:

- (1) K.V. Wong and A. Dybbs, "An Experimental Study of Thermal Equilibrium in Liquid Saturated Porous Media", Int. Heat Mass Transfer, Vol.19, pp. 234-236, 1976.
- (2) S. Sengupta, D. Dasgupta, K.V. Wong, E. Daly, S. Farooq and H.P. Gerrish "Numerical Simulation of Chemically Reacting Flows Through Soils: A Parametric Study", International Journal of Simulation, Vol.1, No. 1, 1981, pp. 21-23.
- (3) A. Dasgupta, N.L. Nemerow, S. Farooq, E. Daly, Jr., S. Sengupta, H.P. Gerrish and K.V. Wong, "Anaerobic Digestion of Municipal Solid Waste", Biocycle Journal, March-April

- 1981, pp. 34-38.
- (4) K.V. Wong, S. Sengupta, D. Dasgupta, E. Daly, N. Nemerow and H.P. Gerrish, "Transport of Heavy Metal Pollutants in Saturated Porous Media", Biocycle Journal, Sep.-Oct. 1981.
- (5) E.L. Daly, Jr., S. Farooq, A. Dasgupta, S. Sengupta, H.P. Gerrish and K.V. Wong, "Reliability of Analytical Methods for Anaerobic Municipal Solid Waste Samples", Journal of Water Pollution Control Federation, Feb. 1982, pp. 187-192.
- (6) K.V. Wong, S. Sengupta, D. Dasgupta, E. Daly, N. Nemerow and H.P. Gerrish, "Modelling and Experimental Study of Heavy Metal Migration in Soil Solution Systems", Biocycle Journal, 1-2/1983.
- (7) D. Dasgupta, S. Sengupta, K.V. Wong and N. Nemerow "Two-Dimensional Time Dependent Simulation of Contaminant Transport from a Landfill", J. Applied Mathematical Modelling, 1984, Vol. 8, June, pp.203-210.
- (8) H.P. Gerrish, E. Daly, S. Sengupta and K.V. Wong, "Size Distribution of Airborne Particulate Matter Emitted by the Front-End Processing of Municipal Solid Waste Feed Material for Large-Scale Anaerobic Digesters", J.Air Poll. Control Assoc, July 1984.
- (9) K.V. Wong, S. Sengupta and D. Dasgupta, "Prediction of Cation Mobility in Soils from the Linear Distribution Coefficient", International Symposium on Industrial and Hazardous Solid Wastes, Philadelphia, March 1983, invited for revision and in Hazardous and Industrial Waste Management and Testing, ASTM, 1984, pp. 81-91.
- (10) K.V. Wong, G. Yeh and E. Davis, "The Field Validation of the Geohydrology Simulation Model FEWA", J. Applied Mathematical Modelling, Vol. 9, Oct. 1985.
- (11) K.V. Wong and G. Yeh, "Application of the Finite Element Groundwater Model FEWA to Three Regional Aquifers", 3/1985, ORNL/CF-85/54, invited for revision and in ORNL/TM-9678, 6/86.
- (12) K.V. Wong and G. Yeh "Field Validation of the Contaminant Transport Model, FEMA," J. Applied Mathematical Modelling, Vol. No. 3, June 1986.
- (13) K.V. Wong, G. Yeh and E. Davis, "Predictive Application of a ORNL Geohydrology Model," J. Ground Water, Vol. 25, No.3, 1987.
- (14) S. Sengupta, K.V. Wong, N.L. Nemerow, H.P. Gerrish, E. Daly and A. Tilles, "An Environmental Characterization Study of a Proof- of-Concept Municipal Solid Waste Digestion Plant: Pompano Beach, FL," Conservation and Recycling, Vol.10, No.4, pp.281-298, 1987.
- (15) K.V. Wong,"Three Shells Used for Hydrocarbon Identification in Engineering," Computers in Education, Division of ASEE, Vol. VIII, No.1, Jan.-March 1988.
- (16) K.V. Wong and D. Houston, "Software System Design for Surface Water Permitting," Int. Journal Applied Engineering Education, Vol. 4, No. 3, 1988.
- (17) K.V. Wong and A. Rashid "A Mathematics Consultant for Engineering Undergraduates," Computers in Education, Vol. X, No. 4, Oct.-Dec. 1990.
- (18) K.V. Wong, "Easy Referencing in Mechanical Engineering Topics," Computers in Education, Vol. X, No. 3, July-Sept. 1990.
- (19) K.V. Wong and F. Ferrano, "Availability-Based Computer Management of a Cold Thermal Storage System," ASHRAE Transactions, Vol. 96, Part 1, 1990.
- (20) Y. Ding and K.V. Wong, "Control of a Simulated Dual Temperature Hydronic System Using a Neural Network Approach," ASHRAE Transactions, Vol. 96, Part 2, 1990.
- (21) F. Ferrano and K.V. Wong, "Prediction of Thermal Storage Loads Using A Neural Network," ASHRAE Trans., Vol. 96, Part 2, 1990.
- (22) K.V. Wong and Z. Niu, "User-Modifiable Heat Exchanger Expert System," ASHRAE Transactions, Vol. 97, Part 2, 1991.
- (23) K.V. Wong, "Innovation in the Senior Fluids and Thermal Sciences Laboratory," ASME Curriculum Innovation Awards Paper, 1990.
- (24) K.V. Wong and Z. Niu, "Thermodynamic Optimization of the Boiler and Turbine with

- Condenser," ASHRAE Trans, Vol. 97, Part 2, 1991.
- (25) G. Gill and K.V.Wong, "Passive Solar Design for Windows Using a Neural Network," ASHRAE Transactions, Vol. 97, Part 2, 1991.
 - (26) A. Rashid and K.V. Wong, "A Neural Network Approach to the Determination of Aquifer Parameters by the Type-Curve Matching Method," J. of Ground Water, March-April 1992.
 - (27) A. Rashid and K.V. Wong, "Computer-Aided Modelling of Heterogeneous, Two-Dimensional, Ground-Water System," Computers & Geosciences, Vol.18,No.9, 1992.
 - (28) M. Miller and K.V. Wong, "Prediction of Vulnerable Zones for Reactive Substances," J. Environmental Health, Oct. 1993.
 - (29) L. Zhang and K.V. Wong, "Expert System for Cryogenic Piping Systems," ASHRAE Transactions, Vol. 100, Part 2, 1994.
 - (30) K.V. Wong, Y. Zhu, "Using a Combustion Expert System to Help Combat Oil Spills," Computers in Education, Vol. XIV, No. 4, Oct.-Dec. 1994.
 - (31) K.V.Wong, R.Narasimhan, R.Kashyap, J. Fu, "Medical Waste Characterization and Front-End Analysis," J. Environmental Health, July/August 1994.
 - (32) K.V. Wong and N. Paradiso, "A Decision Support System to Assist in Selecting A Chemical Oil Spill Dispersant," Computers in Education, Jan.-March 1995.
 - (33) D. Brown and K.V.Wong, "A Knowledge-Based System for Residential Energy Conservation in a Sub-Tropical Climate," Computers in Education, April-June 1995.
 - (34) K.V. Wong and D. Guerrero, "Quantitative Analysis of Shore-Line Protection by Boom Arrangements," Spill Science and Technology Bulletin, Vol. 2, No. 1, June 1995.
 - (35) D.S. Yeh and K.V. Wong, "HVAC Pipe/Duct Sizing Using Artificial Neural Networks," Int. J. Modelling & Simulation, 1996.
 - (36) K.V. Wong and N. Abu Ghait, "Relative Values of Damage Assessed for the Gulf of Mexico, the Atlantic Coast and the Pacific Coast," Spill Science and Technology Bulletin, Vol.2, No. 2, August 1996.
 - (37) Z. Niu and K.V. Wong, "Adaptive Simulation of Boiler Unit Performance", Energy Conversion and Management, Vol 39, No 13, pp. 1383-1394, 1998.
 - (38) S. Sengupta, S. Sherif and K.V.Wong, "Empirical Heat Transfer and Frost Thickness Correlations during Frost Deposition on a Cylinder in Cross-Flow in the Transient Regime," Int. Journal of Energy Research, Vol.22, No.7, June 1998.
 - (39) S. Lu, K.V.Wong and L.Stoff, "Exergetic Analysis of Cooling Systems with Ozonation Water Treatment," Energy Conversion and Management, Vol 39, No 14, pp. 1407-1422, 1998.
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- (42) K.V. Wong and Z. Niu, "Optimization at Different Loads by Minimization of Irreversibilities," Proc. ASME Winter Annual Meeting, Atlanta, GA, 1991.
- (43) A. Rashid and K.V. Wong, "The Role of Diffusion in the Migration of Contaminants in Porous Media via an Expert System," EOS Trans., Am. Geophysical Union Meeting, 12/91, San Francisco, CA.
- (44) F. Ferrano and K.V. Wong, "Optimum System Operation of Packed-Tower Aeration for the Treatment of Contaminated Groundwater Using a Neural Network," Proc. FLAIRS Conf., April 1992, Ft. Lauderdale, Florida, U.S.A.
- (45) K.V. Wong, "Optimization of an Air Stripper Using a Neural Network," Proc. Second WPCF Asia/Pacific Rim Conference on Water Pollution Control, Yokohama, Japan, June 25-27, 1992.
- (46) K.V. Wong and T. Ponce, "Mechanical Methods for Responding to Oil Spills in Water," Proc. ASME Eco World '92, Washington D.C., June 14-17, 1992.
- (47) K.V. Wong and K. Yao, "Rankine Cycle Analysis Using Neural Network," Proc. ASME WAM 1992, Anaheim, California.
- (48) Z. Niu and K.V. Wong, "Adaptive Simulation of Boiler Performance," Proc. ASME WAM 1992, Anaheim, California.
- (49) A.Rashid and K.V.Wong, "Simultaneous Effects of Crossflow and Viscous Shear in Boundary-Layer Flow Along Permeable Fracture Wall on Fracture Flow and Permeability," EOS Transactions, American Geophysical Union Meeting, 12/92,

- San Francisco, CA.
- (50) K.V. Wong, "Groundwater Contamination," Invited Keynote Speech, Proc. Flow in Florida, Wakulla Springs, Florida, 26-27 March 1993.
 - (51) S. Sengupta and K.V. Wong, "A Neural Network approach to Learn the Comfort Equation," Proc. FLAIRS Conf., April 1993, Ft. Lauderdale, Florida.
 - (52) K.V.Wong, R. Narasimhan, R. Kashyap, J. Fu, "Hospital Waste Management in Florida," Proc. FCSHWM 1st Annual Solid Waste Research Symposium, Orlando, Florida, 25 May, 1993.
 - (53) E. Jorigne, K.V.Wong, "Oil Spill Preparedness in the Mediterranean Sea," Proc. 16th AMOP Tech Sem, Calgary, Canada, 7-9 June, 1993.
 - (54) F. Arnan and K.V.Wong, "Oil Spill Preparedness in Indonesia and the Surrounding Seas," Proc. 16th AMOP Technical Seminar, Calgary, Canada, 7-9 June 1993.
 - (55) S. Sengupta, S. Sherif and K.V. Wong, "Measurements of the Frost Formation and Heat Transfer on Cylinders in Humid Air Cross Flow," Proc. CLIMA 2000, London, England, Nov. 1993.
 - (56) J. Fu, K.V. Wong, R. Narasimhan, R. Kashyap, "Energy Analysis of the Recycling Process as compared to the Incineration Process," Proc. ASME WAM '93, New Orleans, LA.
 - (57) A.Rashid and K.V.Wong, "Three-Dimensional Flow along the Interface of a Porous Medium of Low Porosity: An Investigation of Boundary-Layer Flow along Permeable Fracture Wall," EOS Trans, AGU, Dec 1993, San Francisco.
 - (58) K.V.Wong and R.Kashyap, "Estimating the Burn Rate from the Boom Configuration," Proc. 17th AMOP Technical Seminar, Vancouver, Canada, 8-10 June, 1994.
 - (59) K. Yao and K.V.Wong, "Boiler Combustion Performance Comparing Different Fuels," Proc. ASME WAM '94, Chicago, IL.
 - (60) A. Rashid and K.V.Wong, "Experimental Investigation of Boundary-Layer Flow Along the Surface of a Porous-Medium Model," EOS Trans, AGU, Dec 1994, San Francisco.
 - (61) S. Sengupta, S. Sherif and K.V. Wong, "Correlation Formulas for the Frost Thickness and Heat Transfer Coefficient on a Cylinder in Humid Air Cross Flow," Proc. National Heat Transfer Conference, Portland, Oregon, 1995.
 - (62) K.V.Wong and D. Guerrero, "Protection of Natural Resources against Oil Spills by Boom Arrangement," Proc. Int. Oil Spill Conf, Long Beach, Feb. 1995.
 - (63) A. Rashid and K.V.Wong, "Fully-developed Flow in a Rectangular Channel of Finite Aspect Ratio with One Wall Bounded by a Saturated Porous Medium," Proc. Int. Cnf. Energy and Environment, Shanghai, China, May 1995.
 - (64) T. Zhou and K.V.Wong, "Vapor Concentration of Benzene in the Atmosphere incurred by an Oil Spill," Proc. Second Int. Oil Spill R & D Forum, London, U.K., May 1995.
 - (65) K.V.Wong and D. Guerrero, "Quantitative Analysis of Shore-line Protection by Boom Arrangements," Proc. Second Int. Oil Spill R & D Forum, London, U.K., May 1995.
 - (66) C. Douligeris, C. Ip, J.D. Englehardt, E. Iakovou, K.V. Wong and C. Mooers, "NMOTSM: A National Marine Oil Transportation Model," Proc. 2nd Int. Oil Spill R & D Forum, London, U.K., May 1995.
 - (67) K.V.Wong and M. Witmer, "Flow Around an Oil Boom System," Proc. Eighteenth Arctic and Marine Oilspill Program Technical Seminar, Edmonton, Canada, June 14-16, 1995.
 - (68) S. Yeh and K.V.Wong, "HVAC Pipe/Duct Sizing Using Artificial Neural Networks," Proc. 30th Intersociety Energy Conversion Engr. Cnf., Orlando,

- Florida, July 31-Aug 4, 1995.
- (69) K.V.Wong and A. Rashid, "Development of Hydrodynamic Flow in a Coupled Channel-Porous Cavity," EOS Trans, AGU, Dec 1995, San Francisco.
- (70) J. Fu, K.V.Wong, R. Narasimhan, R.Kashyap, "Mass, Energy Balance and Flue Gas Generation from a Medical Waste Incinerator," Proc. ASME Int. Mech. Eng. Congress and Exp '95, San Francisco.
- (71) K.V. Wong and A. Wolek, "Application of Flow Visualization to the Development of an Innovative Boom System," Proc. Nineteenth Arctic and Marine Oilspill Program Technical Seminar, Calgary, Canada, June 12-14, 1996.
- (72) K.V. Wong, H. Solo-Gabriele and G. He, "Infiltration Rates through Synthetic Caps and Side Slopes at Landfills," FCSHWM Fourth Annual Research Symp., Tampa, Oct. 3, 1996.
- (73) K.V. Wong and A. Rashid, "Measurements using Particle Image Velocimetry of Velocities across the Fluid-Porous Medium Interface," EOS Trans, AGU, Dec 1996, San Francisco.
- (74) K.V. Wong, "The Dynamics of Change in a Country, with a Perspective from Thermodynamics," Proc. Sixth Int. Conf. Productivity & Quality Research, Houston, TX, March 1997.
- (75) T. Zhou and K.V. Wong, "Modeling Airborne Levels of Some Volatile Components in Oil Spills," Proc. Int. Oil Spill Conference, Ft. Lauderdale, April 1997.
- (76) K.V.Wong, G. Generalis, L. Hernandez, J. Padin and N. Paradiso, "Relative Values of Damage Assessed for the Gulf of Mexico, the Atlantic Coast and the Pacific Coast, for Sample Hazardous Materials," Proc. 14th Tech Sem Chem Spills, Vancouver, Canada, June 9-10, 1997.
- (77) K.V.Wong and L. Hernandez, "Improved Method of Oil Collection in Rivers and Channels," Proc. 19th AMOP Tech Sem, Vancouver, Canada, June 11-13, 1997.
- (78) S. Lu, K.V.Wong and L. Stoff, "Optimization of a Cooling Tower with Ozonation based on Exergy," Proc. ASME Int. Engineering Congress and Exposition '97, Dallas, Texas.
- (79) K.V. Wong, "The Adjustment Periods of Immigrants as Predictable from Energy Sciences," Proc. 7th Int. Cnf. Management of Tech., Feb. 1998, Orlando, FL.
- (80) K.V.Wong, M.Witmer, B.Crowder, S.Y.Han, D.P.Serretti, "Design Improvements to Waste-to-Energy Plants Using Exergetic Analysis as a Project for the Second Course of Thermodynamics," Proc. ASME Int. Eng Congress and Exposition, Nov. '98, Anaheim, CA.
- (81) K.V. Wong and I. Kusijanovic, "Oil Spill Recovery Methods for Inlets, Rivers and Canals," Int Oil Spill Conference, Seattle, Washington, March 1999.
- (82) K.V.Wong and L. Hernandez, "Arrangements of Collection Devices to Better Gather Spilled Oil," 20th AMOP Tech. Seminar, Calgary, Canada, June 1999, poster session.
- (83) J. Fang and K.V. Wong, "Instability Study of Oil Slicks Contained by a Single Boom," Prc 21st AMOP Tech Smr, Vancouver, Canada, 6/2000.
- (84) J. Fang and K.V.Wong, "Optimization of an Oil Boom Arrangement," Proc. 17th Biennial Int. Conf. On Oil Spills, Tampa, FL, March 2001.
- (85) G. Milian, C. Wilson and K.V. Wong, "Industrial Cleaning Products: Detrimental to Employees?" Proc. IAMOT 2002, Miami Beach, FL, U.S.A., March 2002.
- (86) K.V. Wong, E.Barin and J. Lane, "Field Experiments at the Ohmsett Facility for a Newly Designed Boom System," Proc. 25th AMOP

- Tech. Seminar, Calgary, Canada, June 2002.
- (87) K.Sopian, E.Adam, M.S.Abdullah and K.V.Wong, "Heat Transfer and Pressure Drop Correlations for Double-Pass Solar Collector with and without Porous Media," Proc. ASME IMECE 2002, Nov. 2002, New Orleans, La.
 - (88) J. Malo-Malina, K.V.Wong and A. Brankovic, "Innovative Nozzle Design for Film Cooling System to Maximize Turbine Efficiency," Proc. ASME IMECE 2002, Nov. 2002, New Orleans, La.
 - (89) C. Barufaldi, Jon Kepko and K.V.Wong, " Air Pollution Caused by Scented Candles," Proc. IMECE 2002, Nov.2002, New Orleans, La.
 - (90) K.V.Wong and M. Budair, " Proposed Oil Recovery Wall System for Kuwait's Oil Fields," Proc 26th AMOP, Victoria,Canada,June 03.
 - (91) F.J.Malo-Molina and K.V.Wong, "Analysis of Fuel Sloshing under Micro-Gravity yields New Cryogenic Baffled Tank Design," Proc. Microgravity Transport Proc. in Fluid, Thermal, Biological and Materials Sciences, Davos, Switzerland, Sep.14-19, 2003.
 - (92) K.V.Wong, M. Miller and A. Boccabella, " Inclined Boom System with Hydrofoil for Waters with Waves," Proc 28th AMOP, Calgary,Canada, June 05.
 - (93) K.V.Wong and T. Kurma, "Transport Properties of Alumina Nanofluids." awarded ASME 2006 Best Paper Award, Proc. IMECE 2006, Nov. 2006, Chicago, IL.
 - (94) K.V.Wong, B. Bonn, S. Vu and S. Samed, "Study of Nanofluid Natural Convection Phenomena in Rectangular Enclosures," Proc. IMECE 2007, Nov. 2007, Seattle, WA.
 - (95) K.V. Wong, D. Valdez, J. Goad and J. Losada, "An Alternative Field Test for Spot Air Conditioning Units," Proc. IMECE 2007, Nov. 2007, Seattle, WA.
 - (96) K.V. Wong and P. Garcia, "Introduction of Nanotechnology in the Basic Energy Sciences," Proc.IMECE 2007, Nov. 2007, Seattle, WA.
 - (97) K.V. Wong and T. Kuhn, "A Comparative Analysis of the Economic Viability of STEM and Other Fields of Study, " Proc. IMECE 2007, Nov. 2007, Seattle, WA.
 - (98) K.V.Wong and Ian Gillis, "Transportation Energy Policy with a Focus on Biofuels," Proceedings of the 5th WSEAS Int. Conf. on Heat and Mass Transfer, Acapulco, Mexico, Jan. 2008, pp.188-201.
 - (99) K.V.Wong, W. Hagen and B.D. Do, "Math and Science Education Comparisons between the United States and the Rest of the World," Proc. IMECE 2008, Boston, MA.
 - (100) K.V.Wong, M. Castillo, "Survey and Analysis of Heat Transfer Mechanisms in Nanofluid Systems, including Clustering," Proc. IMECE 2008, Boston, MA.
 - (101) K.V. Wong, H. Samarajeewa, B. Itier, "Lessons Learned from the Use of the Laser Doppler Velocimeter and the Particle Image Velocimeter for Water Flow bounded by a Layer of Oil," Proc. IMECE 2009, Orlando, FL, USA.
 - (102) K.V. Wong, N. Pirella, "Comparison of green house gases emitted by electrical and gasoline cars, taking into consideration Performance" Proc. IMECE 2009, Orlando, FL, USA.
 - (103) K.V. Wong and M. Krell, "Transient Conduction Heat Transfer in a Cancerous Tumour", Photo Gallery Poster, ASME IMECE 2009, Orlando, Fl, USA.
 - (104) K.V. Wong, "The Second Law of Thermodynamics and Heat Release to the Global Environment by Human Activities." IMECE2010-38201. Proc. IMECE 2010, Vancouver, BC, CA.
 - (105) K.V. Wong , J. Plackemeier, "Policies for Effective Trading Scheme to Reduce Carbon Dioxide Emissions," IMECE2010-39723. Proc. IMECE 2010, Vancouver, BC, CA.
 - (106) K.V.Wong, G. Amador, "Power Generation for the Near Future." IMECE2010-37714. Proc. IMECE 2010, Vancouver, BC, Canada.

- (107) K.V.Wong, T. Hutley and E.Salgado, "Offshore Wind Power and its Potential for Development in the West Wind Drift." IMECE2010-39825. Proc. IMECE 2010, Vancouver, BC, CA.
- (108) K.V. Wong, N. Perilla, A. Paddon, "Nano Science and Technology in Solar Cells," Proc. IMECE 2011, Denver, CO, USA.
- (109) K.V. Wong, A. Paddon, A. Jimenez, "Heat Island Effect Aggravates Mortality due to Heat." IMECE2011-62785. Proc. IMECE 2011, Denver, CO, USA.
- (110) K.V. Wong, "The iCritical Thinking Certification Tests for Assessment of University Students," Proc. IMECE 2011, Denver, CO, USA.
- (111) KV Wong, S. Chaudhry, "Use of Satellite Images for Observational and Quantitative Analysis of Urban Heat Islands around the World." IMECE2012-93029. Proc. IMECE 2012, Houston, TX, USA.
- (112) KV Wong, Y. Dai, B. Paul, "Anthropogenic Heat Release Into the Environment", IMECE2012-89465. Proc. IMECE 2012, Houston, TX, USA.
- (113) KV Wong, J Johnston, "Cooling Systems for Power Plants in an Energy Water Nexus Era." IMECE2013-64920. Proc. IMECE 2013, San Diego, CA, USA.
- (114) KV Wong, B Batchelor, "(A Review) Carbon Nanotubes used for Renewable Energy Applications and Environmental Protection/Remediation." IMECE2013-63523. Proc. IMECE 2013, San Diego, CA, USA.
- (115) KV Wong, S Chaudhry, "Climate Change Aggravates the Energy-Water-Food Nexus," IMECE2014-36502. Proc. IMECE 2014, Montreal, Canada.
- (116) KV Wong, N Tan, "Feasibility of Using More Geothermal Energy to Generate Electricity," IMECE2014-36751. Proc. IMECE 2014, Montreal, Canada.

18. **Other Works Accepted for Publication:**

- (1) K.V. Wong and A. Dybbs, "An Experimental Study of Thermal Equilibrium in Liquid Saturated Porous Media", School of Engineering, Case Western Reserve U., FTAS/TR-75-109.
- (2) K.V. Wong A. Dybbs, "Heat Transfer Characteristics of Porous Media", School of Engineering, Case Western Reserve University, FTAS/TR-76.
- (3) S. Sengupta, S.Farooq, H.Gerrish, K.V. Wong and E.L. Daly, Jr., "Characterization and Environmental Studies of Pompano Beach Anaerobic Digestion Facility", Mech. Engineering Dept., University of Miami, Coral Gables, Florida, Mid-term Report, May 1979, DOE Contract # EV-78-S-05-6072.
- (4) S. Sengupta, S. Farooq, H. Gerrish, K.V. Wong, E.L. Daly, Jr., S. Greer and C. Chriswell, "Characterization and Environmental Studies of Pompano Beach Anaerobic Digestion Facility", Mech. Engineering Dept., U Miami, Coral Gables, FL, Annual Report, Aug. 1979, DOE Contract # EV- 78-S-05-6072.
- (5) S. Sengupta, S. Farooq, H. Gerrish, K.V. Wong, E.L. Daly, Jr., "Characterization and Environmental Studies of Pompano Beach Anaerobic Digestion Facility", 4/80, DOE Cntr# EV-78-S-05-10133.
- (6) S.Sengupta,S.Farooq,H.Gerrish,K.V.Wong,E.L.Daly,"Characterization and Environmental Studies of Pompano Beach Anaerobic Digestion Facility", 4/80, DOE # EV-78-S-05-10133.
- (7) S. Sengupta, S. Farooq, H. Gerrish, K.V. Wong, E.L. Daly, Jr., N. Nemerow, "Characterization and Environmental Studies of Pompano Beach Anaerobic Digestion Facility", Mech. Engineering Dept., University of Miami, Coral Gables, Florida, Annual Report,. Aug. 1980, DOE Contract # EV-78-S-05-10133.
- (8) S. Sengupta, K.V. Wong, H. Gerrish, N. Nemerow, E.L. Daly, Jr., "Characterization and Environmental Studies of Pompano Beach Anaerobic Digestion Facility", Feb. 1981, DOE Contract # DE-AS05-78-EV-10133.
- (9) S. Sengupta, K.V. Wong, H. Gerrish, N. Nemerow, E.L. Daly, Jr.,

- "Characterization & Env. Studies of Pompano Beach Anaerobic Digestion Facility", Aug '81, DOE Cntrt # DE-AS05-78-EV-10133.
- (10) S. Sengupta, K.V. Wong, H. Gerrish, N. Nemerow, S. Voorhees, "Characterization & Environmental Studies of Pompano Beach Anaerobic Digestion Facility", 4/82, DOE# DE-AS05-78-EV-10133.
 - (11) S. Sengupta, K.V. Wong, N. Nemerow, M. Strietfeld, A. Tilles, R. Narasimhan, S. Muthuswamy, "Characterization and Environmental Studies on Anaerobic Digestion of Solid Wastes", August 1982, DOE Contract # DE-AS05-78-EV-10133.
 - (12) S. Sengupta, K.V. Wong, N. Nemerow, M. Strietfeld, R. Narasimhan, A. Tilles, "Characterization and Environmental Studies on Anaerobic Digestion of Municipal Solid Wastes: Pompano Beach Plant", Final Rep, 1983, DOE Contract # DE-AS05-78-EV-10133.
 - (13) K.V. Wong, G.T. Yeh, "Application of the Finite Element Groundwater Model FEWA to Three Regional Aquifers", March 1985, ORNL/CF-85/54.
 - (14) K.V. Wong, "Conversion of HELMS into an Intelligent Tactical Tool", Aug. 1986, Env. Lab., Waterways Exp Stn, Vicksburg, MS.
 - (15) K.V. Wong, R. Narasimhan, R. Kashyap, J. Fu, "Hospital Waste Management in Florida", 1st Annual Rep, Apr 1993, FCSHWM.
 - (16) K.V. Wong, R. Narasimhan, R. Kashyap, J. Fu, "Hospital Waste Management in Florida", Final Annual Rep, June 94, FCSHWM.
 - (17) K.V. Wong, H. S.-Gabriele, G. He, "Infiltration Rates through Syn-thetic Caps and Side Slopes at Landfills", Final Rep., 4/97, FCSHWM.
 - (18) K.V. Wong, J. Fang, E. Barin, "Field Experiments at the Ohmsett Facility, for a Newly Designed Boom System", Final Rep., Jan 2001, MMS 199PO16195.

PROFESSIONAL

19a. Funded Research Performed:

- | | |
|---------|---|
| 1979-83 | <u>Co-Principal Investigator</u> , Dept. of Energy (DOE), Characterization and Environmental Studies on Anaerobic Digestion of Municipal Solid Wastes: Pompano Beach Plant", (S. Sengupta P.I. of \$720,000 for 6 years.) |
| 1980-81 | <u>Conference Co-Chairman</u> , DOE, U.S. Environmental Protection Agency (USEPA), "Resource Recovery Conference", \$45,000. |
| 1983-84 | <u>Conference C0-Chairman</u> , DOE, USEPA, "Municipal, Hazardous and Coal Waste Management", \$25,000. |
| 1984-85 | <u>Principal Investigator</u> , Oak Ridge National Laboratory (ORNL), "Field Validation of the ORNL hydrogeological model, FEWA", \$16,000. |
| 1985 | Summer sabbatical at Oak Ridge Nat. Lab. |
| 1985-86 | <u>Principal Investigator</u> , (P.I.), ORNL, "Field Validation of the ORNL Contaminant Transport Model, FEMA", \$22,516. |
| 1986 | Summer sabbatical at Waterways Exp. St., \$12,000 |
| 1987 | Sun Microsystems equipment donation, \$55,000. |

1988	<u>P.I.</u> , Inference Corp. award, \$10,000.
1988	<u>P.I.</u> , Business Computer Solutions Inc. award, \$8,300.
1988	<u>P.I.</u> , Real Time Systems Inc. award, \$11,000.
1988-89	<u>P.I.</u> , U.S. Geological Survey, "Search Strategy for the Zone of Influence", \$19,800.
1989	<u>P.I.</u> , Inference Corporation award, \$8,000.
1989	<u>P.I.</u> , FI Power & Light, "Quality and Engineering Economy", \$12,000.
1989-90	<u>P.I.</u> , FI Power & Light, "Second Law Analysis for Power Plants", \$16,200.
1991	<u>Conference Chairman</u> , FL Center Solid Haz. Wastes Mng., "Waste-to- Energy Workshop", \$5,000.
1992-94	<u>P.I.</u> , FL Center Solid Haz. Wastes Mng., "Hospital Waste Management", \$209,275, approx. \$105,000 a year.
1993	<u>Co-P.I.</u> , Florida Power & Light, "Large Scale Demonstration of Electron Beam Sterilization of Infectious Hospital Waste", \$20,000.
1993-94	<u>Co-P.I.</u> , U.S. Coast Guard, "Coastline Protection from Oil Spills", \$17,135.
1993	<u>P.I.</u> , FL Dept. of Env. Regulation, "Program Manager, Oil Spill Research", \$50,000.
1994-1995	<u>P.I.</u> , Peace Fellowship Program, \$10,000.
1994-95	<u>Co-P.I.</u> , U.S.C.G., "National Oil Transportation System", \$200,000.
1995	<u>P.I.</u> , Alumni donation for lab equipment, computer, etc., \$1,100.
1995-96	<u>P.I.</u> , Florida Power & Light Co., "Cooling Tower Water Treatment Technologies", \$16,950.
1996-97	<u>P.I.</u> , FL Center Solid Haz. Wastes Mng., "Infiltration Rates through Synthetic Caps and Side Slopes at Landfills", \$22,000.
1999-2001	<u>P.I.</u> , U.S.Minerals Management Services, "Field Experiments at the Ohmsett Facility", \$85,883.
2001	<u>P.I.</u> , Instructional Advancement Grant, \$5000.
2001-2002	<u>P.I.</u> , Flow Parametrics, \$6600.
2003-2004	<u>P.I.</u> , Instructional Advancement Grant, \$2400.
2006-2007	Tablet P.C. Fellowship, \$2500.

2009-2010 P.I., U.Miami FLC, \$1500.

19b. Invited Talks:

"Comparison of EP, ASTM-A and ASTM-B Extraction Procedures in Waste", Joint USA - Taiwan EPA Conference, New York, Nov. 1982.
 "The Role of Fluid Mechanics in Groundwater Management", ASME Winter Annual Meeting, San Francisco, Dec. 1989.
 "Groundwater Contamination in Florida", Flow in Florida: A Symposium on Fluid Dynamics in Environmental Problems of Florida, Wakulla Springs, FL, March'93.
 "The Newfoundland Burn Experiment", C.O.E. Sem. Ser., U. Miami, Oct 1993.
 "Natural Resources of Malaysia and Sustainable Development", Southeastern U.S.A. Conference for Malaysian Students, University of Miami, June 1994.
 "Characterization of Medical Waste", 2nd Annual Environmental Essentials for the '90s Workshop, Miami, Florida, April 1995.
 "Flow in Porous Media", Xian Jiaotong University, Xian, China, May 1995.
 "Flow in Porous Media", Beijing Tsinghua University, Beijing, China, May 1995.
 "Municipal Solid Waste Incineration", World Renewable Energy Congress 1999, Kuala Lumpur, Malaysia, 8-11 June, 1999.
 "Changeover to Computerized Thermodynamic Tables in an Academic Setting", University Kebangsaan, Bangi, Malaysia, July 2001.
 "Innovative Oil Spill Equipment Research", University of Vermont, Burlington, Oct. 2004.
 "Short Course – Research, Accreditation, Education", Universidad Guanajuato, Salamanca, Mexico, Oct. 2004.
 "Second Law of Thermodynamics and Exergy", Institution of Engineers, Malaysia, 2-Day Professional Continuing Education Course, July 2009.
 "Energy Productivity", ASME Regional Conference, Coral Gables, FL, 2010.

20. Professional and Honorary Organizations:

Life Fellow of ASME
 Life Associate Fellow of AIAA
 Life Member of American Geophysical Union
 Life Member of Water Pollution Control Federation
 Member of the ASEE
 Member of Sigma Xi
 Member of Pi Tau Sigma
 Member of Tau Beta Pi
 Member of Omicron Delta Kappa
 Member of FLAIRS
 Member of Air & Waste Management Association

21. Honors and Awards:

(a1) 2016 Engineers' Council Distinguished Engineering Educator
 (a2) 2015 ASME Dixy Lee Ray Award
 (a) 2006 ASME Best Paper Award
 (b) 1990 Third Runner-Up for Canham Award, WEF.
 (c) 1990 ASME Curriculum Innovation Honorable Mention Award.
 (d) 2007 – Advisor of ASME Design Team Regional Winners

- (e) 1997- Outstanding Service Award from Grad. School
 - (f) 1997- Mentor of graduate student, G.He, who won the 1997 Florida Environmental Exposition student paper competition.
 - (g) 1993-2014 Nominator for the National Collegiate Engineering Awards.
 - (h) 1983 Elected Honorary Member of Pi Tau Sigma.
 - (i) 1970-1973 National Electricity Board Scholarship, University of Malaya, Malaysia.
 - (j) 1983 – Present: Marquis Who's Who in North America.
 - (k) 1983 – Present: Marquis Who's Who in the World.
- II.
- (a) 2009 Best Photo of Lowe Art Museum Competition
 - (b) 2008 Best Photo of Center for Latin American Studies Annual Photography Competition, University of Miami.
 - (c) 2003 Placed Photo of NY Institute of Photography international competition.
 - (d) 2002 Placed Photo of NY Institute of Photography international competition.

EDITORSHIP in JOURNALS and BOARD MEMBERSHIP

- (1) 2010-2016: Associate Editor, ASME Journal of Energy Resources Technology.
- (2) 2013-present: Co-Editor-in-Chief, J. Renewable Bioresources
- (3) 2014-present: Editorial Board Member, J. Surface Modeling & Additive Manufacturing.
- (4) 2014-present: Co-Editor-in-Chief, J. of Modern Mechanical Engineering and Technology
- (5) 2015-2016: Editor-in-Chief, Advanced Sustainable Engineering Journal
- (6) 2015-present: Editorial Board Member, Research & Review, J. Ecology and Environment Sciences
- (7) 2016-present: Editorial Board Member, J. of Basic and App. Research International, International Knowledge Press
- (8) 2016-present: Editorial Board Member, J. Epidemiology and Public Health Reviews, Sci Forschen publishers.
- (9) 2016-present: Editorial Board Member, The Scientific Pages of Aerospace Engineering and Mechanics
- (10) 2016-present: Editorial Board Member, The Scientific Pages of Metallurgical and Material Engineering
- (11) 2016-present: Editorial Board Member, Austin Journal of Nanomedicine & Nanotechnology
- (12) 2016-present: Editorial Board Member, Global Journal of Immunology and Allergic Diseases, Synchro Publishers.
- (13) 2017-present: Editorial Board Member, J. Health Informatics and Management, SciTechnol Publishers.
- (14) 2017-present: Editorial Board Member of J. Clinical Medicine and Therapeutics, iMedpub.

TEACHING

24. Teaching Awards Received:

- (a) 1990 received ASME Curriculum Innovation Honorable Mention Award - International Competition.
- (b) Received the 1995 Graduate Mentor Award for Excellence in Research and Creativity.
- (c) 2007 – Advisor of ASME Design Team Regional Winners

25. **University Committee and Administrative Responsibilities:**

- (a) Member of the College of Engineering Ethics Board (1982 to 1986).
- (d) Member of the College of Engineering Scholastic Standards and Advising Committee (1985 to 1992, 2009).
- (c) Member of the College of Engineering Computer Facility Planning Advisory Committee (1986 to 1993).
- (d) Chairman of the Mechanical Engineering Department Research Committee (1986 to 1995).
- (e) Member of the Mechanical Engineering Department Graduate Admissions Committee (1986 to present).
- (f) Member of the Mechanical Engineering Department Laboratory Committee, Graduate Studies Committee (1986 to present).
- (g) Member of the College of Engineering Honor Council ('87 to '93).
- (h) Board Member, Ocean Pollution Res. Center, U. Miami ('92-94).
- (i) Chairman of the Mechanical Engineering Department Scholarship Fund (1988 to 1994).
- (j) Member of the College of Eng Scholarship Comm. (1990 to 2001).
- (k) Chairman, COE comm. on Faculty-Admin. Relationship (1996/97).
- (l) Graduate Councilor for the College of Engineering (1991 to 1997).
- (m) Engineering Rep. to University Fellowship committee(1998 to 1999).
- (n) Chairman, ABET Engineering Criteria 2000 for Mechanical Engineering Department (1999 to 2001).
- (o) Advisor for UM's First NASA Anti-g Flight Team (2001).
- (p) College Councilor for the College of Engineering (1996-1999-2012-2015).
- (q) Member of the COE strategic planning committee (1995 to 2004).
- (r) Member of the standing Faculty Senate Committee on Rank, Compensation and Conditions of Service (2001 to 2005).
- (s) Member of the COE faculty sabbatical leave committee (2005-2014).
- (t) Member of the standing Faculty Senate Committee on Student Affairs (2006 to 2010).
- (u) Member of the Faculty Senate Professional Conduct Com.(2008-10).
- (v) Member of the Faculty Senate Hearing Committee (2008-2011).
- (w) Faculty Senator (2011-2014).

26. **Community Activities:**

- (a) Faculty Adviser to the Malaysian Student Association of the University of Miami (1980 to 2001).
- (b) Faculty Adviser to the U.M. Badminton Association (1981 to 1986).
- (c) Board of Directors and Hon. Treasurer of Castle Luxury Condo, Inc., Miami, 1981/82.
- (d) President,Board of Directors,Castle Luxury Condo, Miami, 1982/83.
- (e) Board member for the Brownell Award ('85, '89, '92, '96, '97).
- (f) Scientist for Miami High School Lab Orientation Prog. (1980-93).
- (g) Instructor for the Engineer-In-Training examination (1983 to 1996, 1998-1999).
- (h) Scientist for the Miami-Dade High School Internship Program (1980-2000).
- (i) Faculty Adviser to Pi Tau Sigma (1987 to 2014).
- (j) Asst. Vice-Chair (Administration) of the Systems Analysis technical committee, Advanced Energy Division, ASME, (1999 - 2000); Vice-Chair (Admin.) of same comm., Adv. Energy Div., ASME (2000-2002); Chair same comm., Adv. Energy

- Div., ASME (2002-2003).
- (k) Exec. Comm. Member of Advanced Energy Systems Division (AESD), ASME (2004-2011); Secretary-Treasurer of AESD, ASME (2007-2008); Vice-Chairman of AESD, ASME (2008-2009), Chairman of AESD, ASME (2009-2010), Past Chairman of AESD (2010-2011).
- (l) Member of the ASME Energy Conversion Group Board (2010-11).
- (m) Member of the ASME Technical Communities Operating Board Committee on Administration and Finance (2011-12.)
- (n) ABET mechanical engineering evaluator (2000 to 2003).
- (o) Member of the ASME Energy Committee (2009-14).
- (p) Chairman of the Edward F. Obert Award Comm., ASME (2010-15).
- (q) Instructor for the M.E. Professional Engineer's examination (2010).
- (r) Vice-Chairman of the ASME Technical Communities Operating Board Committee on Honors and Awards (2011-12).
- (s) Executive Member of ASME Energy Conversion Group (2012-14).
- (t) Chairman of the Globalization Medal Committee (2011-2016).
- (u) Assoc. Editor for ASME Journal of Energy Resources Technology (2010-2016).
- (v) Committee Member of the ASME Calvin Rice Award (for Distinguished Speaker) (2011-2017).
- (w) Vice-Chairman of the ASME Technical Communities Operating Board Committee on Administration and Finance (2011-12).
- (x) Chairman of the ASME TCOB Honors Committee (2012-2014).
- (xi) Deputy Group Leader, ASME Energy Conversion Group (2012-14).
- (xii) AIAA UN COPUOS (Committee On Peaceful Uses of Outer Space) Working Group member (2016-present).
- (xiii) ASME Committee on Energy-Water Nexus.
- (xiv) Associate Editor, ASME Journal of Energy Resources Technology (2010-16).
- (xv) Reviewer of ASME journals. (2010-present).