

CURRICULUM VITAE

YIDING CAO

Professor, ASME Fellow, and Graduate Program Director
Department of Mechanical and Materials Engineering
Florida International University
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CAREER OBJECTIVE

Teaching, Research, and Development in Mechanical and Aerospace Engineering.

EDUCATION

Ph.D. in Mechanical Engineering (12/1991), University of Dayton, Dayton, Ohio.

G.P.A.: 4.0/4.0.

M.S. in Thermal Engineering (7/1984), Chongqing University, PRC.

B.S. in Power Engineering (2/1982), Harbin Engineering University, PRC.

PERSONAL DATA: U.S. Citizen

ACADEMIC APPOINTMENTS

8/1993-present, Professor/Associate Professor/Assistant Professor, Department of Mechanical and Materials Engineering, College of Engineering and Computing, FLORIDA INTERNATIONAL UNIVERSITY

1/1992-7/1993, Research Scientist/Research Associate, Department of Mechanical and Materials Engineering, Dayton, Ohio, WRIGHT STATE UNIVERSITY.

9/1984-1/1986, Instructor, Department of Chemical Engineering, CHENGDU UNIVERSITY OF SCIENCE AND TECHNOLOGY, Chengdu, PRC.

PUBLICATIONS

a. LIST OF PEER-REVIEWED JOURNAL PUBLICATIONS (Total: 73):

1. Popoola, O.T., and Cao, Y., 2016, “A Numerical Model of a Reciprocating-Mechanism Driven Heat Loop (RMDHL) for Two-Phase High Heat Flux Cooling,” *ASME Journal of Thermal Science and Engineering Applications*, in press.
2. Popoola, O. T., Soleimanikutanaei, S., and Cao, Y., 2016, “Numerical Simulation of a Reciprocating-Mechanism Driven Heat Loop (RMDHL),” *Journal of Heat Transfer Research*, in press.
3. Hu, L., Chen, D., Li, L., Cao, Y., Yuan, D., Wang, J., and Pan, L., 2015, “Investigation on the performance of the supercritical Brayton cycle with CO₂-based binary mixture as working fluid for an energy transportation system of a nuclear reactor,” *Energy*, Vol. 89, pp. 874–886.
4. Wang, F., Cao, Y. and Zhou, J., 2015, “Thermodynamic analysis of high-temperature helium heated fuel reforming for hydrogen production,” *International Journal of Energy Research*, Vol. 39, pp. 418–432.
5. Wang, F., Cao, Y., and Guoqiang Wang, G., 2015, “Thermoelectric generation coupling methanol steam reforming characteristic in microreactor”, *Energy*, Vol. 80, pp. 642-653.
6. Chen, D., Ye, X., and Cao, Y., 2015, “FULL-CYCLE SIMULATION OF DIESEL ENGINE PERFORMANCE WITH THE EFFECT OF HEAT TRANSFER TO THE ENVIRONMENT,” *Journal of Heat Transfer Research*, Vol. 47, Issue 1.
7. Cao, Y., 2014, “Theory and performance analysis of a new heat engine for concentrating solar power,” *Int. J. Energy Res.*, DOI: 10.1002/er.3187.
8. Cao, Y., Reding, B., and Ling, J., 2014, “Experimental Study of Miniature Radially Rotating Heat Pipes with Water as the Working Fluid,” *Journal of Heat Transfer Research* 45(2), 137–144.
9. Cao, Y., Reding, B., and Gao, M., 2013, Rotating Miniature and Sector Heat Pipes for Cooling Gas Turbine Rotor Blades and Disks, *Journal of Heat Transfer Research*, 44(1), pp. 1-14 (2013).
10. Xiao, L., and Cao, Y., 2012, “Recent Advances in Pulsating Heat Pipes and Its Derivatives,” *J. Enhanced Heat Transfer*, 19(3), pp. 213–231.
11. Cao, Y. and Ling, J., 2012, “Performance Simulations of a Gas Turbine Disk-Blade Assembly Employing Miniature Rotating Heat Pipes,” *ASME J. Heat Transfer*, Vol. 134, 051016.
12. Cao, Y., Xu, D., and Gao, M., 2012, “Experimental Study of a Bellows-Type Reciprocating-Mechanism Driven Heat Loop,” *Int. J. Energy Res.* DOI: 10.1002/er.2889.
13. Cao, Y., 2011, “An Internal Combustion Engine Platform for Increased Thermal Efficiency, Constant-Volume Combustion, Variable Compression Ratio, and Cold Start,” *Int. J. Energy Research*, DOI: 10.1002/er.1823.

14. Wu, S.Y., Xiao, L., Cao, Y., and Li, Y.R., 2010, "Convection heat loss from cavity receiver in parabolic dish solar thermal power system: A review," *Solar Energy*, 84 (2010) 1342–1355.
15. Cao, Y. and Chen. D., 2010, "A Cold-Start Method and Analysis for Internal Combustion Engines Particularly using a Renewable Fuel," *Int. J. Energy Research*, DOI: 10.1002/er.1683.
16. Gao, M., Cao, Y., and Zampino, M., 2010, "Ceramic Miniature Heat Pipes and Liquid Charging Methods," *Journal of Heat Transfer Engineering*, 31(7):1–6.
17. Cao, Y., 2010, "Miniature High-Temperature Rotating Heat Pipes and Their Applications in Gas Turbine Cooling," *Frontiers in Heat Pipes (FHP)*, 1 - 023002 (2010).
18. Wu, S.Y., Xiao, L., and Cao, Y., 2009, "A Parabolic Dish/AMTEC Solar Thermal Power System and its Performance Evaluation," *Journal of Applied Energy*, 87 (2010) 452–462.
19. Gao, M., and Cao, Y., and Zampino, A., 2009, "Ceramic Miniature Heat Pipes and Liquid Charge Methods," *Journal of Heat Transfer Engineering*, accepted for publication.
20. Wu, S.Y., Xiao, L. Cao, Y., 2009, "A Review on Advances in Alkali Metal Thermal to Electric Converters (AMTECs)," *Int. J. Energy Res.*, DOI: 10.1002/er.1584.
21. Cao, Y. and Ponnappan, R., 2008, "A Liquid Cooler Module with Carbon Foam for Electronics Cooling Applications," *J. Enhanced Heat Transfer*, 15 (4) 313- -324.
22. Cao, Y. and Gao, M., 2008, "Experimental and Analytical Studies of Reciprocating Mechanism Driven Heat Loops (RMDHL), *ASME Journal of Heat Transfer*," Volume 130, pp. 7290.
23. Guo, Z. and Cao, Y., 2007, "Spontaneous Uplift in Biliquid Capillary Siphons," *Journal of Transport in Porous Media*, Vol. 67, No. 2, pp. 317 – 322 (6).
24. Cao, Y., 2005, "Analysis of an Energy Recovery System for Reformate-Based PEM Fuel Cells Involving a Binary Two-Phase Mixture," *Journal of Power Sources*, 142/2, pp. 258-264.
25. Guo, Z. and Cao, Y., 2005 "Experimental Studies of Biliquid Capillary Siphons," *Chemical Engineering Science*, Vol. 60, Issue 10, pp. 2621-2626.
26. Guo, Z. and Cao, Y., 2004, "A Passive Fuel Delivery System for Portable Direct Methanol Fuel Cells," *Journal of Power Sources*, 132/1-2, pp. 86-91.
27. Ling, J., Cao, Y., Rivir, R. and MacArthur, C., 2004, "Analytical Investigations of Rotating Disks with and without Incorporating Rotating Heat Pipes," *ASME Journal of Engineering for Gas Turbines and Power*, Vol. 126, pp. 680-683.
28. Gao, M. and Cao, Y., 2002, "Flat and U-Shaped Heat Spreaders for High-Power Electronics," *Journal of Heat Transfer Engineering*, Vol. 24, No. 3, pp. 57-65.
29. Cao, Y. and Guo, Z., 2002, "Performance Evaluation of an Energy Recovery System for Fuel Cell Reforming of PEM Fuel Cell Power Plants," *Journal of Power Sources*, Vol. 109, pp. 287-293.
30. Cao, Y. and Gao, M., 2002, "Wickless Network Heat Pipes for High Heat Flux Spreading Applications," *Int. J. Heat Mass Transfer*, Vol.. 45, pp. 2539-2547.

31. Gao, M., Cao, Y., Beam, J.E., and Donovan, B., 2000, "Structural Optimization of Axially Grooved Plate Miniature Heat Pipes," *Enhanced Heat Transfer*, Vol. 7, pp.361-369.
32. Ling, J. and Cao, Y., 2001, "Experimental Investigations of a Radially Rotating Miniature High-Temperature Heat Pipe for Turbine Blade Cooling," *ASME Journal of Heat Transfer*, Vol. 113, pp. 113-119.
33. Ling, J. and Cao, Y., 2000, "Closed-Form Analytical Solutions for the Radially Rotating Miniature High-Temperature Heat Pipes Including Non-Condensable Gas Effects," *Int. J. Heat Mass Transfer*, Vol. 43, No. 19, pp. 3661-3671.
34. Ling, J., Cao, Y., and Chang, W.S., 1999, "Analysis of Radically Rotating High-Temperature Heat Pipes for Turbomachinery Application," *ASME Journal of Engineering for Gas Turbines and Power*, Vol. 121, pp. 306-312.
35. Chen, G., Wang, Q., and Cao, Y., 2000, "Experimental Investigation of the Thermal-Tribological Performance of an Isothermal Journal Bearing," *STLE Tribology Transactions*, Vol. 44, n1, pp. 35-40.
36. Wang, Q., Cao, Y., Wang, R., Minion, F., and Chen, G., 2000, "Studies of a Heat-Pipe Cooled Piston Crown," *ASME Journal of Engineering for Turbines and Power*, Vol. 122, pp. 99-105.
37. Wang, Q., Chen, G., and Cao, Y., 1999, "Analyses of Heat-Pipe Cooled Isothermal Journal Bearing," *ASME Journal of Tribology*, Vol. 121, pp. 546-552.
38. Chen, G., Tso, C., Wang, Q., and Cao, Y., 1999, "Development of an Isothermal Journal Bearing by Utilizing Heat-Pipe Cooling Technology," *STLE Tribology Transactions*, Vol. 42, 401-406.
39. Chen, G., Wang, Q. and Cao, Y. 1999, "Modeling the Heat-Source/Heat-Sink for Tribological Applications," *STLE Tribology Transactions*, Vol. 42, pp. 223-230.
40. Ling, J., Cao, Y., and Wang, Q., 1998, "Critical Working Frequency of Reciprocating Heat Pipes in Axially Reciprocating Mechanisms," *Int. J. Heat and Mass Transfer*, Vol. 41, No. 1, pp. 73-80.
41. Zampino, M.A., Jones, W.K., and Cao, Y., 1998, "Substrate Embedded Heat Pipes Compatible With Ceramic Cofire Processing", *Int. J. Microcircuits and Electronic Packaging*, Vol. 21, No. 1, pp. 52-58.
42. Cao, Y., Gao, M.C., Beam, J.E., and Donovan, B., 1997, "Experiments and Analyses of Flat Miniature Heat Pipes," *AIAA Journal of Thermophysics and Heat Transfer*, Vol. 11, No. 2, pp. 158-164.
43. Ling, J. and Cao, Y., 1997, "Frequency Spectrum Analyses and Their Applications to Steam Turbine Vibrations," *ASME Journal of Engineering for Gas Turbine and Power*, Vol. 119, pp. 734-736.
44. Ling, J., Cao, Y., and Wang, Q., 1996, "Experimental Investigations and Correlations for the Performance of Reciprocating Heat Pipes," *Journal of Heat Transfer Engineering*, Vol. 17, No. 4, pp. 34-45.
45. Cao, Y., Beam, J.E., and Donovan, B., 1996, "Air-Cooling System for Metal Oxide Semiconductor Controlled Thyristors Employing Miniature Heat Pipes," *AIAA Journal of Thermophysics and Heat Transfer*, Vol. 10, pp. 484-489.
46. Wang, Q. and Cao, Y., 1996, "Oscillatory Impingement of Liquid Inside Reciprocating Pipes," *Journal of Sound and Vibration*, 197 (5), pp. 619-628.

47. Cao, Y. and Wang, Q., 1995, "Reciprocating Heat Pipes and Their Applications," *ASME J. of Heat Transfer*, Vol. 117, 1094-1096.
48. Cao, Y. and Wang, Q., 1995, "Thermal Analysis of a Piston Cooling System with Reciprocating Heat Pipes," *Journal of Heat Transfer Engineering*, Vol. 16, pp. 50 - 57.
49. Ling, J. and Cao, Y., 1995, "An Improvement on Traditional Balancing Methods for High Speed Rotors," *ASME Journal of Engineering for Gas Turbines and Power*, Vol. 118, pp. 95-99.
50. Faghri, A., Gogineni, S., and Cao, Y., 1995, "Fluid Flow Analysis in an Axially Rotating Porous Pipe with Mass Injection at the Wall," *Journal of Numerical Heat Transfer*, Part A, Vol. 28, pp. 723-739.
51. Cao, Y., 1995, "Heat Pipes--a book review," *Journal of Heat Transfer Engineering*.
52. Wang, Q. and Cao, Y., 1995, "Piston Assembly Design for Improved Thermal-Tribological Performance," *Tribology Transactions*, Vol. 39, pp. 483-489.
53. Cao, Y. and Faghri, A., 1994, "Micro/Miniature Heat Pipes and Operating Limitations," *Journal of Enhanced Heat Transfer*, Vol. 1, No. 3, pp. 265-274.
54. Cao, Y. and Faghri, A., 1994, "Analytical Solutions of Flow and Heat Transfer in a Porous Structure with Partial Heating and Evaporation on the Upper Surface," *Int. J. Heat Mass Transfer*, Vol. 37, pp. 1525-1533.
55. Cao, Y. and Faghri, A., 1994, "Conjugate Analysis of a Flat-Plate Type Evaporator for Capillary Pumped Loops with Three-Dimensional Vapor Flow in the Groove," *Int. J. Heat Mass Transfer*, Vol. 37, pp. 401-409.
56. Cao, Y. and Faghri, A., 1993, "Conjugate Modeling of High Temperature Nosecap and Wing Leading Edge Heat Pipes," *ASME J. Heat Transfer*, Vol. 115, pp. 819-822.
57. Cao, Y. and Faghri, A., 1993, "Simulation of the Early Startup Period of High Temperature Heat Pipes from the Frozen State by a Rarefied Vapor Self-Diffusion Model," *ASME J. Heat Transfer*, Vol. 115, pp. 239-246.
58. Cao, Y. and Faghri, A., 1993, "A Numerical Analysis of High-Temperature Heat Pipe Startup from the Frozen State," *ASME J. Heat Transfer*, Vol. 115, pp. 247-254.
59. Cao, Y. and Faghri, A., 1992, "A Study of Thermal Energy Storage Systems with Conjugate Turbulent Forced Convection," *ASME J. Heat Transfer*, Vol. 114, pp. 1019-1027.
60. Cao, Y. and Faghri, A., 1992, "Closed-Form Analytical Solutions of High-Temperature Heat Pipe Startup and Frozen Startup Limitation," *ASME J. Heat Transfer*, Vol. 114, pp. 1028-1035.
61. Cao, Y. and Faghri, A., 1991, "Transient Multidimensional Analysis of Nonconventional Heat Pipes with Uniform and Nonuniform Heat Distributions," *ASME J. Heat Transfer*, Vol. 113, pp. 995-1002.
62. Cao, Y., Faghri, A., and Juhasz, A., 1991, "A PCM/Forced Convection Conjugate Transient Analysis of Energy Storage Systems with Annular and Counter-Current Flows," *ASME J. Heat Transfer*, Vol. 113, pp. 37-42.

63. Faghri, A., Buchko, M., and Cao, Y., 1991, "A Study of High Temperature Heat Pipes with Multiple Heat Sources and Sinks, Part I: Experimental Methodology and Frozen Startup Profiles," *ASME J. Heat Transfer*, Vol. 113, pp. 1003-1009.
64. Faghri, A., Buchko, M., and Cao, Y., 1991, "A Study of High Temperature Heat Pipes with Multiple Heat Sources and Sinks, Part II: Analysis of Continuum Transient and Steady State Experimental Data with Numerical Predictions," *ASME J. Heat Transfer*, Vol. 113, pp. 1010-1016.
65. Cao, Y. and Faghri, A., 1991, "Performance Characteristics of a Thermal Energy Storage Module: A Transient PCM/Forced Convection Conjugate Analysis," *Int. J. Heat Mass Transfer*, Vol. 34, pp. 93-101.
66. Cao, Y. and Faghri, A., 1990, "A Numerical Analysis of Phase-Change Problems Including Natural Convection," *ASME J. Heat Transfer*, Vol. 112, pp. 812-816.
67. Cao, Y. and Faghri, A., 1990, "Heat Transfer in Liquid Metals by Natural Convection," *Int. J. Heat Mass Transfer*, Vol. 33, pp. 1367-1370.
68. Cao, Y. and Faghri, A., 1990, "Thermal Protection from Intense Localized Moving Heat Fluxes Using Phase-Change Materials," *Int. J. Heat Mass Transfer*, Vol. 33, pp. 127-138.
69. Cao, Y. and Faghri, A., 1990, "A Transient Two-Dimensional Compressible Analysis for High Temperature Heat Pipes with a Pulsed Heat Input," *Journal of Numerical Heat Transfer*, Part A, Vol. 18, pp. 483-502.
70. Cao, Y., Faghri, A., and Chang, W. S., 1989, "A Numerical Analysis of Stefan Problems for Generalized Multi-Dimensional Phase-Change Structures Using the Enthalpy Transforming Model," *Int. J. Heat Mass Transfer*, Vol. 32, pp. 1289-1298.
71. Cao, Y., Faghri, A., and Mahefkey, E. T., 1989, "The Thermal Performance of Heat Pipes with Localized Heat Input," *Int. J. Heat Mass Transfer*, Vol. 32, pp. 1279-1287.
72. Xin, M. D. and Cao, Y., 1987, "Analysis and Experiment of Boiling Heat Transfer on T-Shaped Finned Surfaces," *Chemical Engineering Communications*, **50** (1-6), pp. 185-201.
73. Cao, Y. and Xin, M. D., 1987, "An Equivalent Model of Bubble Growth Rate at the Wall," *Heat Transfer Science and Technology*, Hemisphere Publishing Corporation, pp. 379-385.

b. LIST OF PEER-REVIEWED PAPERS PRESENTED AT NATIONAL OR INTERNATIONAL CONFERENCES AND PUBLISHED IN THE CONFERENCE PROCEEDINGS:

1. Popoola, O.T., Bamgbade, A., and Cao, Y., 2016, "An Evaluation of Turbulence Models for the Numerical Study of Reciprocating-Mechanism Driven Heat Loop," *Fluid Engineering Division Summer Meeting (ASME FEDSM)*.
2. Popoola, O.T. and Cao, Y., 2016, "Numerical Modeling of Two-Phase Reciprocating Flow Using a Virtual Loop," 12th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics.

3. Cao, Y., 2014, "Collaborations on Load Calculations and Building Simulations for Higher Predictive Accuracy," RCN-SEES: Predictive Modeling Network for Sustainable Human-Building Ecosystems (SHBE), Denton, TX, 3/18/2014-3/19/2014.
4. Cao, Y., 2014, "HEAT PIPE SOLAR RECEIVERS FOR CONCENTRATING SOLAR POWER (CSP) PLANTS," *Proceedings of the ASME 2013 7th International Conference on Energy Sustainability & 11th Fuel Cell Science, Engineering and Technology Conference*, Minneapolis, MN, USA, July 14-19, 2013.
5. Cao, Y., 2012, "A NEW HEAT ENGINE AND ITS APPLICATIONS IN CONCENTRATING SOLAR POWER (CSP)," *Proceedings of the ASME 2012 6th International Conference on Energy Sustainability & 10th Fuel Cell Science, Engineering and Technology Conference*, July 23-26, 2012, San Diego, CA, USA.
6. Cao, Y., 2012, "A New Heat Engine for Concentrating Solar Power (CSP) Applications," *Arpa-E Energy innovation Summit*, Washington DC, Feb. 28-March 2, 2012.
7. Cao, Y., 2012, "Development of a Green Air Conditioning System Based on a Rotary Engine Structure," *Arpa-E Energy innovation Summit*, Washington DC, Feb. 28- March 2, 2012.
8. Cao, Y., 2011, "A/C system with zero global warming potentials", *the third annual FESC summit*, Gainesville, Florida, September 27-28.
9. Cao, Y., Gao, M., and Reding, B., 2009, Experimental Studies of Rotating Heat Pipes for Cooling Gas Turbine Rotor and Disks," AIAA paper No. 2009-1427.
10. Cao, Y. and Kengskool, K, 2009. "An Automotive Radiator Employing Wickless Heat Pipes," MAESC 2009 Conference, Memphis, TN.
11. Cao, Y. and Jian Ling, J, 2009, "Performance Simulations of a Gas Turbine Disk-Blade Assembly," ASME 2009 Micro/Nanoscale Heat and Mass Transfer International Conference, Shanghai, China, December 18-22, 2009.
12. Cao, Y. and Ling, J., "An Experimental Study of Micro Radially Rotating Heat Pipes with Water as the Working Fluid," *Proceedings of ASME MNHT2008 Micro/Nano Scale International Heat Transfer Conference*, January 6-9, 2008, Tainan, Taiwan, MNHT2008 – 52115.
13. Cao, Y., 2007, "Thermodynamic Cycles of Internal Combustion Engines for Increased Thermal Efficiency, Constant-Volume Combustion, Variable Compression Ratio, and Cold Start," *Powertrain & Fluid Systems Conference* October 29 - November 1, 2007, Chicago, Illinois, Paper No. 07FFL – 20.
14. Cao, Y., 2007, "Operation and Cold Start Mechanism of Internal Combustion Engines with Alternative Fuels," 14th Asia Pacific Automotive Engineering Conference (APAC-14), August 5-8, 2007, Hollywood, California, Paper No. 07APAC -55.
15. Cao, Y., 2007, "Fuel Cell Stacks Based on Micro Fuel Cell Units for a Substantially Increased Power Density," *Proceedings of MNC2007 MicroNanoChina07*, January 10-13, Sanya, Hainan, China, Paper No. MNC2007 – 21471.

16. Cao, Y., 2007, "PEM Fuel Cell Stacks with High Power Density for Portable Applications," Small Fuel Cell Conference, March 7-9, Miami, Florida.
17. Ponnappan, R and Cao, Y., 2005, Thermal Management Employing Carbon Foam Coolers, Air Force Thermal management workshop.
18. Cao, Y. and Ponnappan, R., 2004, "A Liquid Cooler Module with Carbon Foam for Electronics Cooling Applications," AIAA 2004-492, 42nd AIAA Aerospace Sciences Meeting and Exhibit, 5-8 January 2004, Reno, Nevada.
19. Cao, Y. and Gao, M., 2003, "Reciprocating-Mechanism Driven Heat Loops and Their Applications," Proceedings of ASME Summer Heat Transfer Conference, July 20-23, Las Vegas, Nevada, HT2003 – 47195.
20. Cao, Y. and Guo, Z., 2003, "A Reformate-Based PEM Fuel Cell Power Plant Employing a Novel Energy Recovering System for Fuel Processing", 2003 Fuel Cell Seminar: Fuel Cells for Secure, Sustainable Energy, Miami Beach, Florida, November 3-7.
21. Cao, Y. and Guo, Z., 2003, "Development of a completely passive micro Direct Methanol fuel Cell for Portable Application," 2003 Fuel Cell Seminar: Fuel Cells for Secure, Sustainable Energy, Miami Beach, Florida, November 3-7.
22. Zhen Guo, Yiding Cao, 2003, "A Passive Fuel Delivery system for Direct Methanol Fuel Cells", Advances in Materials for Proton Exchange Membrane Fuel Cell System, Pacific Grove, California, February 23-27.
23. Cao, Y. and Gao, M., 2002, "A Reciprocating-Mechanism Driven Heat Loop for High Heat-Flux Thermal Management," SAE Power Systems Conference, 2002-01-3197, Coral Springs, Florida, October 29-31, 2002.
24. Cao, Y. and Ling, J., 2001, "Performance Evaluation and CFD Analysis of a New Jet Ejector Employing a Conical Porous Duct," ASME Fluid Engineering Division Summer Meeting.
25. Cao, Y., Ling, J., Rivir, R., and MacArthur, C., 2000, "A Numerical Analysis of Gas Turbine Disks Incorporating Rotating Heat Pipes," Proceedings of ASME International Mechanical Engineering Congress and Exposition, Vol. 3, pp. 61-67, Orlando, Florida.
26. Gao, M., Cao, Y., Jones, K., and Zampino, M., 2000, "Ceramic Miniature Heat Pipes and Liquid Charging Methods," International Mechanical Engineering Congress and Exposition, Nov. 5-10, Orlando, Florida.
27. Cao, Y., Ling, J. and Chang, W.S., 1998, "Analyses of Liquid and Vapor Flows in a Miniature Radially Rotating Heat Pipe for Turbine Blade Cooling Applications, " 11th International Heat and Mass Transfer Conference, August, South Korea.
28. Mignano, F., Wang, R., Chen, G., Wang, Q., Cao, Y., and Vargas, A., 1998, "Development of a Diesel-Engine Piston By Incorporating Heat Pipe Technology – Experimental Simulation of Piston Crown," SAE, 98P-206.
29. Wang, R., Mignano, F., Wang, Q., Cao, Y., and Chen, G., 1998, "Simulation of a Heat Pipe Cooled Piston Crown for Developing Piston with Improved Thermal-Tribological Performance," 1998 Spring ASME-ICE Division Engine Technology Conference, Fort Lauderdale, FL.

30. Wang, R., Mignano, F., Wang, Q., and Cao, Y., 1998, "Development of a Diesel Engine Piston by Incorporating Heat Pipe Technology – A FEM Modeling of Simulated Piston Crown," SAE 981043.
31. Cao, Y. and Chang, W.S., 1997, "Analyses of Heat Transfer Limitations of Radially Rotating Heat Pipes for Turbomachinery Applications," AIAA 32nd Thermophysics Conference, AIAA 97 – 2542, June 23-25, Atlanta, GA.
32. Cao, Y. and Gao, Y., 1997, "High Heat-Flux Network Heat Pipes Employing Boiling Mechanisms in a Narrow Space," AIAA 32nd Thermophysics Conference, AIAA 97 – 2541, June 23 -23, Atlanta, GA.
33. Ling, J., Cao, Y., and Wang, Q., 1997, "Transversally Reciprocating Heat Pipe (TRHP) and its Applications in Cutting Tools," HTD-Vol. 349, 1997 *National Heat Transfer Conference*, August 10-12, Baltimore, MD, pp. 81-88.
34. Gao, M., Cao, Y., Beam, J., and Donovan, B., 1997, "Structure Optimization of Axially Grooved Flat Miniature Heat Pipes," 1997 *AIChE Symposium Series*, Vol. 93, pp. 152-157.
35. Cao, Y., Gao, M., and Pinilla, E., 1997, "Fabrication and Test of a Filling Station for Micro/Miniature Thermal Devices," 32nd *Intersociety Energy Conversion Engineering Conference*, July 27-August 1, Honolulu, HI.
36. Wang, Q., Cao, Y., and Chen, G., 1996, "An Exploratory Study for a Thermal-Tribological Approach to Reduce Temperature due to Frictional Heating," 51st STLE Annual Meeting.
37. Wang, Q., Cao, Y., and Velasquez, A., 1996, "A Study of the Critical Impingement Frequency of Fluid in Curved Pipes for Piston Applications," SAE Paper No. 960050.
38. Cao, Y., Ling, J., and Wang, Q., 1996, "Analytical and Experimental Investigations for Critical Working Frequency of Reciprocating Heat Pipes with Piston Cooling Applications," *AIChE Symposium Series*, Vol. 92, pp. 317-323.
39. Cao, Y., Wang, Q., and Ling, J., 1995, "Operating Limitation of Reciprocating Heat Pipes for Piston Cooling Applications," ASME 1995 IMECE, HTD-Vol. 317-1, pp. 235- 241.
40. Cao, Y., Beam, J. E., and Donovan, B., 1995, "Cooling of MCTs Incorporating Miniature Heat Pipes as Thermal Spreaders," 30th *Intersociety Energy Conversion Engineering Conference*, Orlando, Florida, Vol. 1, pp. 589-594.
41. Cao, Y. and Wang, Q., 1995, "Piston Cooling with Shaking-Up Heat Pipes (SUHP) and Thermal Analysis of the Cooling System," SAE paper No. 950526.
42. Wang, Q., Cao, Y., and Souto, A., 1995, "Development of a New Engine Piston Incorporating Heat Pipe Cooling Technology," SAE *Analysis of New Diesel Engine and Component Design*, pp. 19-25.
43. Cao, Y. and Wang, Q., 1995, "Piston Cooling Employing Reciprocating Heat Pipes and Performance Analysis of the Cooling System," SAE *Analysis of New Diesel Engine and Component Design*, pp. 73-78.
44. Cao, Y. and Faghri, A., 1992, "Analyses of Transient and Steady-State Performances of Nosecap and Wing Leading Edge Heat Pipes," *Heat Pipes and Thermosyphons*, ASME HTD-Vol. 221, pp. 43-51.

45. Cao, Y. and Faghri, A., 1992, "Analyses of High Temperature Heat Pipe Startup from the Frozen State, Part I: Numerical Simulation," *Proc. 28th ASME National Heat Transfer Conference*, San Diego, CA.
46. Cao, Y. and Faghri, A., 1992, "Analyses of High Temperature Heat Pipe Startup from the Frozen State, Part II: Closed-Form Analytical Solutions and Startup Limitation," *Proc. 28th ASME National Heat Transfer Conference*, San Diego, CA.
47. Faghri, A. and Cao, Y., 1992, "Numerical Analysis of Leading Edge and Nosecap Heat Pipes," *Proc. 8th International Heat Pipe Conference*, September 14-18, Beijing, China.
48. Cao, Y. and Faghri, A., 1991, "Transient Analysis of Nonconventional Heat Pipes," *Fundamentals of Forced Convection Heat Transfer*, ASME HTD-Vol. 181, pp. 1-8.
49. Faghri, A., Cao, Y., and Juhasz, Al., 1990, "Transient Analysis of Heat Pipes," *Proc. 7th International Heat Pipe Conference*, Minsk, U.S.S.R.
50. Cao, Y. and Faghri, A., 1989, "A Temperature Transforming Model With a Fixed Grid Numerical Methodology for Phase-Change Problems Including Natural Convection," *Proc. 25th ASME National Heat Transfer Conf.*, Philadelphia, HTD-Vol. 109, pp. 45-53.
51. Cao, Y. and Xin, M. D., 1988, "Mechanism of Boiling Hysteresis of Enhanced Surfaces," *Proc. Intern. Symp. Heat Transfer in Electronic and Microelectronic Equipment*, Session 5, No. 5.2, Aug. 29-Sept. 2, Dubrovnik, Yugoslavia.
52. Du, Y. and Cao, Y., 1985, "An Experimental Study on the Feeding System of Diesel Fuel/Methane Engines," *Proc. Fifth Annual Conference of Engineering Thermophysics Society*, Suzhou, PRC.
53. Cao, Y., Xin, M. D., and Chen, Y., 1984, "Analysis and Experiment on the Critical Level of Boiling in Liquid Film," *Proc. Fourth Heat Transfer Conference of Engineering Thermophysics*, Wuhan, PRC.

c. U.S. PATENTS (Total: 16)

1. Cao, Y., 2015, Dry-Cooling System, US patent pending.
2. Cao, Y., 2012, Heat Pipe Solar Thermochemical Reactor Units, US patent pending.
3. Cao, Y., 2012, Heat Pipe Receivers for Concentrated Solar Power, US patent pending.
4. Cao, Y., 2012, Heat engine and Refrigerator, US patent No. 8,176,748.
5. Cao, Y., 2011, Heat engine, US patent No. 7,937, 943.
6. Cao, Y., 2011, Refrigerator, US patent No. 7,784,300.
7. Cao, 2011, "Cao Fuel Cell Stack with Large Specific Reactive Surface Area," U.S. Patent No. 8,076,042.
8. Cao, Y, 2009, "Cycles of Internal Combustion Engine with Increased Expansion Ratio, Constant-Volume Combustion, Variable Compression Ratio, and Cold Start Mechanism," US Patent No. 7,624,709.
9. Cao, Y. and Gao, M., 2005, "Reciprocating-Mechanism Driven Heat Loop," U.S. Patent No. 6,684,941.

10. Guo, Z. and Cao, Y., 2004, "Passive Fluid Pump and Its Application to Liquid-Feed Fuel Cell System," U.S. Patent Publication No. 20060046123.
11. Cao, Y., 2002, "Waste Heat Recovery Means for Fuel Cell Power System", U.S. patent No. 6,926,979.
12. Wang, Q. and Cao, Y., 2001, "Isothermal Journal Bearing," U.S. Patent No. 6210042.
13. Cao, Y., 1998, "Gas Turbine Rotor Blade," U.S. Patent allowed.
14. Cao, Y. and Wang, Q., 1996, "Engine Piston," U. S. Patent No. 5454351.
15. Cao, Y., 1996, "Heat Pipe Engine Cooling Radiator," U.S. Patent abandoned.
16. Cao, Y., 1995, "Human Body Cooling Suit," U. S. Patent No. 5386701.

FUNDED RESEARCH

a. FUNDED COMPETITIVE GRANTS (Total as P.I. or Co-P.I.: \$4.7 Million)

1. "UniversityCity Community Transit Vehicle Improvements (UniversityCity CTVI)," \$170,000, Department of Transportation, 1/1/16-12/30/16.
PI: Andres Tremante
Co-PI: Drs. Brian Reding, Ibrahim Tansel, Yiding Cao and others.
2. "RCN-SEES: Predictive Modeling Network for Sustainable Human-Building Ecosystems (SHBE)," \$652,846, National Science Foundation, 9/1/2013-8/31/2018.
PI: Yong Tao (UNT)
Specialist: Yiding Cao and other 3 Universities
3. "A Novel Air Conditioning System using a Gas Refrigerant with a Zero Global Warming Potential," \$30,000, FRSP, 7/1/2011-10/1/2012.
PI: Yiding Cao
4. "A New Heat Engine for Renewable Energy/Energy Efficiency Applications," \$40,000, FIU CEC Reseed, 9/1/2011-8/30/2012.
PI: Yiding Cao
Co-PI: K. Wu
5. "A Fundament Study of Cold Plates Based on the Concept of Reciprocating-Mechanism Driven Heat Loops," \$75,000, Thermo-fluid Solutions, 5/2011 – 4/2014.
P.I.: Yiding Cao
6. "New A/C System using Refrigerants with Zero Global Warming Potential," \$20,000, Redland Tropical Fruits, LLC, 11/1/2009 – 8/15/2010.
P.I.: Yiding Cao
7. "Rotating Heat Pipes and Design, Fabrication & Assembly of a High-Speed Rig for Gas Turbines," \$85,000, NASA/SFTI, first year, 1/1/07 – 3/31/08.
P.I.: Yiding Cao
Co-P.I.: Professor Ali Gordon, UCF
8. "Experimental Study of Heat Pipes and Internal Turbulated Channel Flow for Gas Turbine Rotor Blade Cooling through Measurements at High-Rotation Numbers," \$90,000, NASA/SFTI, first year, 1/1/07 – 3/31/08.
P.I.: Yiding Cao

- Co-P.I.: Professor Jay Kapat, UCF.
9. "Development of Nanocrystalline Materials for Intermediate Temperature SOFC (IT-SOFC) Applications," \$85,000, NASA/SFTI, first year, 1/1/07 – 3/31/08.
P.I.: Professor Arvind Agarwal
Co-P.I.: Yiding Cao
 10. "Design, Assembling, and Test of a Demonstration Hydrogen Fuel Cell Stack," \$42,500, 4/1/05 – 3/31/06, Eastern Hydrogen Energy Corporation.
P.I.: Yiding Cao
Co-P.I.: Xiangyang Zhou
 11. "An Experimental Study of Bi-Liquid Capillary Pump for Direct Formic Acid Fuel Cells," \$19,986, Renew Power, Inc.
P.I.: Yiding Cao
Co-P.I.: None
 12. "Using Design, Build and Test Projects for Improving the Design of Fluid-Thermal Systems and HVAC Design," \$116,940, 8/04-7/07, NSF.
P.I.: Dr. Yong Tao
Co-P.I.: Dr. Yiding Cao
 13. "A Carbon-Foam Cooler for Micro Climate Conditioning," First Year: \$49,000, 2/03-2/04, U.S. Army Natick Soldier Center.
P.I.: Y.Cao
Co-P.I.: None
 14. "Miniature Heat Pipe Devices for Gas Turbine Engine Applications," \$315,000, Air Force Research Lab, 6/1999-4/2003.
P.I.: Y. Cao
Co-P.I.: None
 15. "Integrated Thermal Management Using Laminate and Ceramic-MEMS Technologies," \$600,000, DARPA, 12/99-4/2002.
P.I.: K. Jones
Co-P.I.: Y. Cao
 16. "Micro Heat Pipes Embedded in Laminate Substrates for Enhanced Thermal Management of Printed Wiring Board," \$268,000, BMDO, 12/99-11/2001.
P.I.: Dr. W.K. Jones
Co-P.I.: Drs. K. Wu and Y. Cao
 17. "An Innovative Miniature/Micro Heat Pipe Filling Process," \$100,000, Wright-Patterson Air Force Base, 3/97 - 3/99.
P.I.: Yiding Cao
Co-P.I.: Dr. W. K. Jones
 18. "A Thermal-Tribological Approach for Designing Tribological Elements and its Application to Piston Engines – Phase II," \$200,000, DOD Office of Naval Research, 1/97-6/99.
P.I.: Dr. Q. Wang
Co - P.I.: Yiding Cao
 19. "Meas-Simulation Equipment for a Thermal-Tribological System," \$157,366, DOD, 3/98-3/99.
P.I.: Dr. Q. Wang

- Co - P.I.: Yiding Cao
20. "An Innovative Turbine Blade Cooling Technology and Micro/Miniature Heat Pipes for Turbine Cooling Applications," Air Force Office of Scientific Research, \$242,000, 6/96-6/99.
P.I.: Yiding Cao
Co-P.I.: None
 21. "Embedded Heat Pipes in Ceramic Electronic Packages for Enhanced Thermal Management," \$300,000, Wright-Patterson Air Force Base, 4/96- 4/99.
P.I.: Dr. W. K. Jones
Co-P.I.: Yiding Cao
 22. "Research and Development of a Novel Journal Bearing for Thermal-Tribological Considerations," \$57,000, DOD Office of Naval Research, 9/96- 9/98.
P.I.: Dr. Q. Wang
Co-P.I.: Yiding Cao
 23. "A Thermal-Tribological Approach for Designing Tribological Elements and its Application to Piston Engines," \$300,000 (ONR: 260,000, FIU: 40,000), DOD Office of Naval Research, 6/95-6/97.
P.I.: Dr. Q. Wang
Co - P.I.: Yiding Cao
 24. "Solidification of Binary Mixtures in Porous Media in the Presence of Double Diffusive Convection," \$36,000, National Science Foundation, 11/1994-12/1995.
P.I.: Yiding Cao
 25. "Structural Improvement of the Ground Based Radar Systems Using Advanced Materials," Sponsored by United States Army Space and Strategic Defense Command (USASSDC), \$450,858, 6/94 – 6/98.
P.I.: Dr. K.H. Wu
Co-P.I.s: Drs. C. Levy, A. Ebadian, G.P. Cherepanov, and Yiding Cao
My responsibility was in charge of thermal analysis on the T/REA housing.
 26. "Micro Heat Pipes for Electronic Cooling Applications," \$100,000, Wright-Patterson Air Force Base, 10/94-2/97.
P. I.: Yiding Cao
Co - P.I.: None
 27. Technical Consultant, "An Air Dryer Design for Heat Pipe Processing," \$300, ABB Air Preheater Inc., 11/93-12/93.
P.I.: Yiding Cao
 28. Yiding Cao, Summer Faculty Research Program, Air Force Office of Scientific Research/Air Force Research Lab. , \$12,000, 6/2002-8/2002.
 29. Yiding Cao, Summer Faculty Research Program, Air Force Office of Scientific Research/Wright-Patterson AFB, Aircraft Gas Turbine Engine Division, \$12,000, 6/97-8/97.

b. INTERNAL RESEARCH FUNDING

30. Cao, Y., "A Thermal Anemometer for Undergraduate Teaching and Research, \$17,080, Dept. of Mechanical Engineering, FIU, 4/97.
31. Cao, Y., Starting Fund, \$20,000, College of Engineering and Design, FIU, 9/93.