# *PROF. RAJESH KUMAR*

Professor, Department of Mechanical Engineering
Delhi Technological University, Bawana Road, Delhi-110042
Mobile-08750632739
E mail id- dr.rajeshmits@gmail.com, rajesh.kumar@dtu.ac.in,
DOB: 01/01/1975

**EXPERIENCE: 24 years 7 months of teaching and research**

**EMPLOYMENT TILL DATE:**

- **PROFESSOR** (Delhi Technological University, New Delhi)-15th June 2015 to till date
- **ASSOCIATE PROFESSOR** (Delhi Technological University, New Delhi)-15th June 2012 to 14th June 2015.
- **READER** (MITS, Gwalior): 10th August 2010 to 11th June 2012.
- **LECTURER** (Amity School of Engg. and Tech., New Delhi):1st August 2000 to 31st July 2010.

**SPECIALIZATION:** Refrigeration & Air- conditioning, Fluid Mechanics, Thermodynamics, Heat transfer, solar energy, hydrogen energy, Renewable energy, Micro and Nano scale heat transfer, computational fluid dynamics

**ACADEMIC QUALIFICATIONS:** B.Tech.(Mech. Engg.), M.E.(Thermal Engg.), Ph.D. (Thermal Engg.)

**RESEARCH PUBLICATIONS:**
Published in International Journal = 70
International Conference = 25
ORCID ID=0000-0002-9839-6001

## RESEARCH PAPERS PUBLISHED IN: **INTERNATIONAL JOURNALS**

1. Mayank Singhal, **Rajesh Kumar**, R. S. Walia, S. K Pandey (2024). Evaluation of Tribological and Cooling performance of TiN and DLC coated pistons for miniature Stirling Cryocooler MAPAN (Journal of Metrology Society of India, Springer) (accepted for publication)

2. Mayank Singhal, **Rajesh Kumar**, R Walia, S. K Pandey,. (2023). Experimental Investigation and Thermophysics Analysis of Joule Thomson Cooler Applicable to Infrared Imaging. Defence Science Journal, 73(4), 457-467. https://doi.org/10.14429/dsj.73.18686

3. Abhishek Kumar, **Rajesh Kumar** "Annual energy, exergy and efficiency analyses for conical solar still combined with N number of evacuated collectors" Environmental Progress & Sustainable Energy. (2024) (Wiley, SCIE Indexed, online)

4. Yogendra Singh, Vikrant Yadav, Umakanta Sahoo, Anish Malan, Senthil Kumar, Arun Kumar Tripathi, **Rajesh Kumar**, Pushpendra Singh & Chandan Banerjee (2023): Experimental investigation of an innovative solar dryer integrated with the thermal energy storage system, International Journal of Ambient Energy(Taylor & Francis), DOI:10.1080/01430750.2023.2199759

5. Abhishek Kumar, **Rajesh Kumar** "Exergo-enviro-economic analyses and productivity evaluation of conical solar still integrated with evacuated collectors for sustainable solar distillation" Desalination and Water Treatment. (2024) (Elsevier, SCIE Indexed, under review)

6. Faizan Khalid, **Rajesh Kumar** "Thermodynamic assessment of a new PTC operated polygeneration system for fresh water, cooling, electricity and hydrogen production for a residential community" International Journal of Hydrogen Energy (2023) (Elsevier, SCIE indexed) (https://doi.org/10.1016/j.ijhydene.2023.03.176)

7. Prabhat Ranjan, **Rajesh Kumar** and R.S. Walia "Morphological microstructural and mechanical study of FGM coatings prepared using HVOF technique" Journal of Mechanical Science and Technology. (2023) (springer, SCIE indexed) (https://doi.org/10.1007/s12206-023-1024-2)

8. Prabhat Ranjan, **Rajesh Kumar** and R.S. Walia "Determination of Mechanical and Tribological Properties of Five Layered FGM Coatings prepared using HVOF Technique" Journal of the National Science Foundation of Sri Lanka. (2023). (SCIE indexed)

**9.** Kaushalendra Kumar Singh, **Rajesh Kumar** "Energy, Exergy, Environmental and Economic Analyses of Natural Refrigerants for Cascade Refrigeration'' Arabian Journal for Science and Engineering. Vol 47, pg.15797-15821 (**March 2022) (Springer, SCIE indexed)** (https://doi.org/10.1007/s13369-022-06804-7)

*10.* Mohd Asjad Siddiqui, Abdul Khaliq, **Rajesh Kumar** "Thermodynamic and Comparative Analysis of Ejector Refrigeration Cycle and Absorption Refrigeration Cycle Integrated Wet Ethanol-Fueled HCCI Engine for Cogeneration of Power and Cooling" **Transactions of the American Society of Mechanical Engineers (ASME)- Journal of Thermal Science and Engineering Applications (2022)** (SCIE indexed) **(Vol. 14 / 041003-1)** (https://doi.org/10.1115/1.4051632)

11. F Khalid, **R Kumar** "Development and assessment of a new solar based trigeneration system using hydrogen for vehicular application in a self-sustained community", **International Journal of Hydrogen Energy, (2022)** Vol. 47, No. 62, PP: 26082-26090. https://doi.org/10.1016/j.ijhydene.2022.04.008 (SCIE Indexed, Q1 Journal, IF:8.2)

**12.** Jayesh Kumar, Pushpendra Singh, and **Rajesh Kumar** "Enhancement of the part-load thermal charging performance of a latent heat thermal energy storage unit with variable length fins at effective locations" **Renewable Energy Focus,** Vol. 43 **(2022)**: pp. 130-145. (**Elsevier**, ESCI indexed) (https://doi.org/10.1016/j.ref.2022.09.005)

**13.** Jayesh Kumar, Pushpendra Singh, and **Rajesh Kumar** "Performance enhancement of latent heat storage unit by the multiple chambers." **Energy Storage**, Vol. 5 **(2023)**: pp. e446. (**WILEY** ESCI indexed) ( https://doi.org/10.1002/est2.446)

14. Jayesh Kumar, Pushpendra Singh, and **Rajesh Kumar** "Impact of Eccentric Tube Shapes and Heat Pipes on Phase Change Material's Thermal Charging" **Heat Transfer Engineering**, **(2024)** pp. 1-17. (**TAYLOR & FRANCIS.** SCIE indexed) ( https://doi.org/10.1080/01457632.2024.2362538)

15. Sachin Rana, Mohammad Zunaid , **Rajesh Kumar** "Enhancement of thermal energy storage in a phase change material heat exchanger having elliptical and circular tubes with & without fins, Journal of Energy Storage (Elsevier), 56 (2022) 105856. (Elsevier, SCIE indexed) (https://doi.org/10.1016/j.est.2022.105856)

16. Sachin Rana, Mohammad Zunaid, **Rajesh Kumar** "CFD approach for the enhancement of thermal energy storage in phase change material charged heat exchanger," ***Case Studies in Thermal Engineering***,(Elsevier)33, (2022), 101921(https://doi.org/10.1016/j.csite.2022.101921)

*17.* Abdul Khaliq, Bandar A. Almohammadi, Mathkar A. Alharthi**,** Mohd Asjad Siddiqui, **Rajesh Kumar** "Investigation of a combined refrigeration and air conditioning system based on two-phase ejector driven by exhaust gases of natural gas fueled homogeneous charge compression ignition engine" **Transactions of the American Society of Mechanical Engineers (ASME)- Journal of Energy Resources Technology (2021)** Vol. 143 / 120911-1, (https://doi.org/10.1115/1.4052248)

*18.* Mohd Asjad Siddiqui, Abdul Khaliq, **Rajesh Kumar** "Proposal and analysis of a novel cooling-power cogeneration system driven by the exhaust gas heat of HCCI engine fuelled by wet-ethanol" **Energy (2021) Volume 232,** (Elsevier, SCIE indexed) (https://doi.org/10.1016/j.energy.2021.120954)

19. F Khalid, **R Kumar**, F Khalid "Feasibility study of a novel solar based trigeneration system for fresh water, cooling and electricity production", **International Journal of Energy Research, (2021)** Vol. 45, No.13: PP.19500-19508. (SCIE Indexed, Q1 Journal, IF:4.67) **https://doi.org/10.1002/er.7054**

20. Kaushalendra Kumar Singh, **Rajesh Kumar**, Anjana Gupta. "Multi-objective optimization of thermodynamic and economic performances of natural refrigerants for cascade refrigeration" Arabian Journal for Science and Engineering. **(June 2021) (Springer, SCIE indexed)**

**21.** Kaushalendra Kumar Singh, **Rajesh Kumar**, Anjana Gupta "Comparative Exergetic, Economic and Exergoeconomic analysis of a hybrid cascade refrigeration system using ammonia-propane, propane-propylene and isobutane-propane refrigerant pairs", *Int. J. Exergy, Vol. 36, Nos. 2/3/4, 2021,* **Exergy – an international Journal(Inderscience, SCIE indexed) .**

22. Abdul Khaliq, Mathkar A Alharthi, Saeed Alqaed, Esmail Mokheimer, **Rajesh Kumar** "Analysis and Assessment of Tower Solar Collector Driven Trigeneration System" **Journal of Solar Energy Engineering**,142(5), 051003-10 , OCTOBER 2020**, Transactions of the ASME.**

23. Devendra Kumar Gupta, **Rajesh Kumar**, Naveen Kumar, "Performance analysis of PTC field based ejector organic Rankine cycle integrated with a triple pressure level vapor absorption system (EORTPAS)", Engineering Science and Technology, an International Journal **(ELSEVIER, SCIE indexed),** Volume 23, Issue 1, February 2020, Pages 82-91.

24. Kaushalendra Kumar Singh, **Rajesh Kumar**, Anjana Gupta," Comparative energy, exergy and economic analysis of a cascade refrigeration system incorporated with flash tank (HTC) and a flash intercooler with indirect subcooler (LTC) using natural refrigerant couples, **Sustainable Energy Technologies and Assessments(Elsevier)**, Volume 39, 2020, 100716, https://doi.org/10.1016/j.seta.2020.100716.

**25.** Sanjay Sundriyal, Jitender Yadav, R.S. Walia , Vipin, and **Rajesh Kumar, "**Thermophysical-Based Modeling of Material Removal in Powder Mixed Near-Dry Electric Discharge Machining" **Journal of Materials Engineering and Performance(2020), springer. 1059-9495.**

26. Gaurav Krishnayatra, Sulekh Tokas, **Rajesh Kumar**," Numerical heat transfer analysis & predicting thermal performance of fins for a novel heat exchanger using machine learning" **Case Studies in Thermal Engineering(Elsevier**) vol. 21 (2020) 100706.

27. Abdul Khaliq, **Rajesh Kumar**, Esmail M.A. Mokheimer, "Investigation on a solar thermal power and ejector-absorption refrigeration system based on first and second law analyses", **Energy 164 (2018) 1030-1043.**

28. Abdul Khaliq, Esmail M.A. Mokheimer and **Rajesh Kumar**, "Energy and exergy analyses of a solar powered multi-effect cooling cycle", ***Int. J. Exergy****, 27( 4), 2018*

29. U. Sahoo, R. Kumar, S.K. Singh, A.K. Tripathi, "Energy, exergy, economic analysis and optimization of polygeneration hybrid solar-biomass system", **Applied Thermal Engineering** 145 (2018) 685–692

**30.** U. Sahoo, R. Kumar, P C Pant, R. Chaudhary "Resource assessment for hybrid solar-biomass power plant and its thermodynamic evaluation in India" **Solar Energy, 139(2016), 47-57**

31. U. Sahoo, R. Kumar, P.C. Pant, R. Chaudhary "Development of an innovative polygeneration process in hybrid solar-biomass system for combined power, cooling and desalination" **Applied Thermal Engineering 120 (2017) 560–567**

**32.** U. Sahoo, R. Kumar, P C Pant, R. Chaudhary "Scope and sustainability of hybrid solar–biomass power plant with cooling, desalination in polygeneration process in India" **Renewable and sustainable energy reviews,51(2015), 304-316.**

**33.** Devendra Kumar Gupta, **Rajesh Kumar**, Naveen Kumar, Thermodynamic Evaluation of PTC based Organic Rankine Cycle for Power & Cooling, **European Journal of Engineering Research and Science**, 2(1) (2017) 51-58.

34. Devendra Kumar Gupta, Rajesh Kumar, Naveen Kumar "First and Second Law Analysis of Solar Operated Combined Rankine and Ejector Refrigeration Cycle" **International Journal of Applied Solar Energy**, Vol. 50, No.2. 2014, pp. 113-121.
**35.** D. K. Gupta, **R. Kumar,** N. Kumar, Development of Parabolic Trough Collector Based Power and Ejector Refrigeration System Using Eco-Friendly Refrigerants, **Wiley Online Library**, September 2019, DOI: 10.1002/9781119555650.ch5, In book: Progress in Solar Energy Technologies and Applications, (233–308).

36. *Devendra Kumar Gupta*, **Rajesh Kumar**, Thermodynamics Analysis of a Solar Operated Combined Power and Ejector Cooling Cycle with Environmentally Benign Fluids, **Journal of Basic and Applied Engineering Research**, 2(12) (2015) 1009-1012.

37. Rohit Goyal, D. K. Gupta, **Rajesh Kumar**, Md. Nadim Shams. First and Second Law Analysis of a Solar Operated Ejector Absorption Refrigeration System, **International Journal of Applied Engineering Research**, 8(17) (2013)1963-1968.

38. Rohit Goyal, D. K. Gupta, **Rajesh Kumar**, Md. Nadim Shams, Thermodynamic Analysis of Absorption Refrigeration Cycle Using Flat Plate Collector, **International Journal of Applied Engineering Research**, 8(17) (2013) 2017-2022.

**39.** Devendra Kumar Gupta, Rohit Goyal, **Rajesh Kumar**, Md. Nadim Shams, A Thermodynamic Analysis of a Hydrogen Enriched Compressed Natural Gas Fuelled HCCI Engine, **International Journal of Applied Engineering Research**, 8(17) (2013) 2051-2056.

40. Devendra Kumar Gupta, **Rajesh Kumar**, Exergetic Analysis of Combined Power and Ejector Refrigeration Cycle using Solar Energy as Heat Source, **Global Sci-Tech**, 7 (4) (2015) 181-185.

41. Devendra Kumar Gupta, **Rajesh Kumar,** Thermodynamics Analysis of a Solar Operated Combined Power and Ejector Cooling Cycle with Environmentally Benign Fluids, **Journal of Basic and Applied Engineering Research,** 2 (12) (2015) 1009-1012.

**42.** S K Agrawal, **Rajesh Kumar**, Abdul khaliq, P jayaswal "Energy and exergy analysis of a novel solar assisted cogeneration cycle for simultaneous heating and triple effect cooling applications" **Int. J. of Exergy,vol 18, no.3(2015), pp-275-296.**

**43.** Agrawal, Surendra Kumar, **Rajesh Kumar**, "Exergy and Parametric Analyses of a Solar Driven Ejector Cooling and Power Cycle Operating with Butane as a Refrigerant," **Journal of Energy Research and Environmental Technology (2015)**, 2(5), pp. 395-399.

**44.** Agrawal, Surendra Kumar, **Rajesh Kumar**,"Energy and Exergy Analyses of a new Solar Assisted Ejector Cooling and Power Cycle by using Refrigerants R141b, R600, R601 and R601a," **Journal of Material Science and Mechanical Engineering (2015)**, 2(7), pp. 58- 63

**45.** Agrawal, Surendra Kumar, **Rajesh Kumar**,"Energy and Exergy Analyses of a new Solar Assisted Cogeneration Cycle for Simultaneous Production of Power and Double Effect Cooling," **Journal of Material Science and Mechanical Engineering (2015)**, 2(7), pp. 64-69.

46. U.Sahoo, **R. Kumar,** P. C. Pant, S. K. Singh and P. Saxena., Evaluation of Solar Thermal Technologies and Applications in India. Advances in Energy Research. Volume 21, Nova Publisher, Hauppauge NY 11788-3619, U.S.A. (Book Id: 6822 & Chapter Id: 31782).

47. **Rajesh Kumar**, Abdul Khaliq, P.B. Sharma(2013) "Energy and exergy analyses of a new waste heat driven cogeneration cycle for simultaneous cooling and heating applications" **ASHRAE Transactions , pp288-301**

**48.** Abdul Khaliq, **Rajesh Kumar**, Ibrahim Dincer and Farrukh Khalid (2013)'Energy and exergy analyses of a new triple-staged refrigeration cycle using solar heat source' **ASME Transaction, J. Sol. Energy Eng. 136(1) ,doi:10.1115/1.4024126.**

**49.** SK Agrawal, **R Kumar,** A Khaliq (2013) 'First and second law investigation of a new solar assisted thermodynamic cycle for triple effect refrigeration' **International Journal of Energy Research, Article first published online: 21 MAR 2013,DOI: 10.1002/er.3015.**

**50.** Abdul Khaliq, Basant Agrawal and **Rajesh Kumar** (2012) 'First and second law investigation of waste heat based combined power and ejector–absorption refrigeration cycle" **Int Journal of Refrigeration, 35 , pp.88-97 .**

**51. Rajesh Kumar** and Abdul Khaliq,(2011) "Exergy Analysis of Waste Heat Recovery Based Ejector Vapor Compression Refrigeration system" **Int. J Energy Institute, 84(4),192-199 (Switzerland).**

52. Khaliq, A., and **Kumar, R.** (2009) "Exergy analysis of an Industrial Waste Heat Recovery Based Combined Compression Absorption Refrigeration Cycle," In Refrigeration :Theory, Technology and Applications, Nova Science Publishers, Inc., ISBN: 978-1-61668-930-8.

**53.** Khaliq, A., **Kumar, R.,** and Dincer, I., (2009) "Performance Analysis of an Industrial Waste Heat Recovery Based Trigeneration System," **Int. J. of Energy Research, 33, pp.737-744.**

**54.** Abdul Khaliq, **Rajesh Kumar** and I. Dincer (2009) 'Exergy analysis of an industrial waste heat recovery based cogeneration cycle for combined power generation and refrigeration system' **Trans. of ASME-Journal of Energy Resource Technology, JUNE 2009, Vol. 131, pp. 1-7 (USA).**

55. Abdul Khaliq and **Rajesh Kumar** (2008) 'Thermodynamic performance assessment of gas turbine trigeneration system for combined heat cold and power production' Trans. of ASME-Journal of Engineering for Gas Turbines and Power, Vol.130, pp.1-4 (USA).

56. Abdul Khaliq and **Rajesh Kumar** (2008) 'Exergy analysis of double effect vapor absorption refrigeration system' International Journal of Energy Research, Vol.32, pp.161-174 (UK).

57. Abdul Khaliq and **Rajesh Kumar** (2007) 'Exergetic analysis of solar powered absorption refrigeration system using LiBr-H2O and NH3-H2O as working fluids', International Journal of Exergy, Vol. 4, No. 1, pp. 38-53 (Switzerland).

58. Abdul Khaliq and **Rajesh Kumar** (2005) 'Finite-time heat-transfer analysis and ecological optimization of an endoreversible and regenerated gas turbine power cycle', Applied Energy – An International Journal, Vol. 81, pp. 73-84 (Netherland).

59. U. Sahoo, S.K. Singh, **R.Kumar,** P.C.Pant, I.Barbate. "Performance study of an inclined Flat Plate type Solar Water Distillation System". Renewable: wind, water and solar 2016;3:2-5.

60. U.Sahoo, S.K.Singh, **R. Kumar**, P. Kumar. "Mathematical Modelling of Portable Solar Water Heating System". Journal of Technology Innovations in Renewable Energy 2015;4: 91-95.

61. U.Sahoo, S.K.Singh, **R.Kumar**, P.Kumar, "Experimental study of Portable Solar Water heating system". International Journal of Renewable Energy Development 2015;7:107-112.

**62.** Ravindra Kannojiya and **Rajesh Kumar,** Performance Evaluation of Absorption Refrigeration Systems Using Intelligent Optimization Techniques: A Review**,** International Journal of Mechanical and Production Engineering Research and Development (IJMPERD) ISSN (P): 2249–6890; ISSN (E): 2249–8001 Vol. 9, Issue 5, Oct 2019, 961–972 **(Published) (Scopus Indexed Journal)**

63. Ravindra Kannojiya and **Rajesh Kumar**, Thermoeconomic Evaluation & Intelligent Optimization of Solar-thermal Driven Single-Effect LiBr-$H_2O$ Absorption Refrigeration System, Publisher TJPRC. **(Accepted)** (**Scopus Indexed Journal)**

64. Ravindra Kannojiya and **Rajesh Kumar**, Intelligent Optimization of Solar Operated Double-Effect LiBr-$H_2O$ Absorption Refrigeration System, Publisher IJMPERD, TJPRC. **(Accepted) (Scopus Indexed Journal)**

*65.* Sunil Kumar Sinha, Naveen Kumar, **Rajesh Kumar** (2019) Characterization of the Physicochemical Property of Blend of Butanol and Octanol with Biodiesel, *DOI:10.35940/ijitee.L3083.1081219. (Publisher: IJITEE, Scopus indexed)*

66. Sunil Kumar Sinha, Naveen Kumar, **Rajesh Kumar** (2019) Performance emission of n-octanol-biodiesel blend in diesel engine, DOI:.35940/ijrte.D7406.118419 (Publisher: IJRTE, Scopus indexed)

67. Vijay Shekhar Sharma, **Rajesh Kumar,** "Cellulose as Thermal Insulation and Its Comparative study with EPS Insulation". Solid State Technology, PennWell Publishing Co. (SCOPUS JOURNAL, 2020)

68. *Gaurav Krishnayatra*, Sulekh Tokas, **Rajesh Kumar,** "Numerical heat transfer analysis & predicting thermal performance of fins for a novel heat exchanger using machine learning". ***Case Studies in Thermal Engineering, Elsevier (SCIE)***, 2020.

69. *Gaurav Krishnayatra*, Sulekh Tokas, **Rajesh Kumar,** Mohd. Zunaid, "Parametric study of natural convection showing effects of geometry, number and orientation of fins on a finned tube system: a numerical approach", ***Journal of Thermal Engineering (ESCI)***, Yildiz University Press

70. *Gaurav Krishnayatra*, **Rajesh Kumar ,:** "Convective Heat Transfer Analysis of Longitudinal Fins on Horizontal Hollow Cylinder ", International Journal of Mechanical and Production Engineering (IJMPE), 7 (11), 32-37, 2019

# RESEARCH PAPERS PUBLISHED IN: INTERNATIONAL CONFERENCES:

1. Vijay Shekhar Sharma, **Rajesh Kumar,** R S Mishra**.** Advancing Green Building Design: Comparative Thermal Analysis Of Cellulose Fiber And Polyurethane Foam Thermal Insulation Through Simulation Model. Paper presented at: International Conference on Renewable Energy and Sustainable Technologies (ICREST 2024); 2024 July 04-06.

2. Amit Sahu, Mohammad Zunaid, **Rajesh Kumar**; Flow of colloidal nanoparticales in convergent-divergent (C-D) Microchannels, *Paper presented* at International Conference on Renewable Energy and Sustainable Technologies (ICREST-2024), July 4-6, 2024; Jamia Millia Islamia (Central University), New Delhi.

3. Amit Sahu, Mohammad Zunaid, **Rajesh Kumar**; A Review on Microfluidic-Based Electrowetting on Dielectric (EWOD) in State-of-the-Art Adaptive Electronic Cooling; *Paper presented* at 22nd international conference on Recent advances in mechanical engineering for sustainable development, July 11-13, 2024 (Hybrid Mode); Organised by the Department of Mechanical Engineering, DTU, Delhi in collaboration with Indian Society of Mechanical Engineers.

4. Abhishek Kumar, **Rajesh Kumar**. Enhancing Water Sustainability Through Conical Solar Still Technology: A Comprehensive Review*. Paper presented at International Conference on Renewable Energy and Sustainable Technology (ICREST-2024) July 4-6, 2024* at Jamia Millia Islamia (Central University), New Delhi.

5. Abhishek Kumar, **Rajesh Kumar**. The Effect of Nanofluids in Solar Distillation Systems: A Comprehensive Review*. Paper presented at International Conference on Renewable Energy and Sustainable Technology (ICREST-2024) July 4-6, 2024* at Jamia Millia Islamia (Central University), New Delhi.

6. Prabhat Ranjan, **Rajesh Kumar** and R.S. Walia, FGM coating-a review*. Paper presented at*: 3rd International conference on Computational and Experimental Methods in Mechanical Engineering; 2021 Feb 11-13; Greater Noida, India.

7. Prabhat Ranjan, **Rajesh Kumar** and R.S. Walia, Tribological Behaviour of FGM Coating*. Paper presented at*: 3rd International conference on Computational and Experimental Methods in Mechanical Engineering; 2021 Feb 11-13; Greater Noida, India.

**8.** Jayesh Kumar, Pushpendra Singh, and **Rajesh Kumar.** Advancement and challenges in latent heat thermal energy storage system. ***Paper presented at***: International conference on "innovative technologies in Mechanical Engineering" **(ITME- 2019)** on 18-

19th October 2019 by department of Mechanical engineering, KIET group of Institutions , Ghaziabad, U.P. India. **( https://doi.org/10.1007/978-981-15-8704-7_19 )**

**9.** Jayesh Kumar, Pushpendra Singh, and **Rajesh Kumar.** Phase change materials as thermal energy storage medium: state of art review. ***Paper presented at*:** 2nd international Conference on "Sustainable Technologies for Environmental Management" **(STEM-2019)** on March 25-26, 2019, in DTU, Delhi.

10. Jayesh Kumar, Pushpendra Singh, and **Rajesh Kumar.** Influence of geometric parameters on the performance of latent heat thermal energy storage system: A review. ***Paper presented at*:** 1st international Conference on "Energy, Materials Sciences and Mechanical Engineering **(EMSME-2020)**" on October 30th – November 01st 2020 in NIT (National Institute of Technology) Delhi. **(https://doi.org/10.1007/978-981-16-2794-1_103 )**

11. Sachin Rana, Mohammad Zunaid, **Rajesh Kumar**, "CFD Analysis for Heat Transfer Comparison in Circular, Rectangular and Elliptical Tube Heat Exchangers filled with PCM" Materials Today Proceedings (2022). (https://doi.org/10.1016/j.matpr.2021.12.412) (Paper presented at: International Conference on Materials, Mechanics & Modelling, 2022 Mar 4-6, NIT Jamshedpur, India).

12. Sachin Rana, Mohammad Zunaid, **Rajesh Kumar**, "CFD simulation for heat transfer enhancement in phase change materials" Materials Today Proceedings (2021). (https://doi.org/10.1016/j.matpr.2021.02.006) (Paper presented at: International Conference on Technological Advancements in Materials Science and Manufacturing, 2021 Feb 19-20, GEU Dehradun, India).

13. F Khalid**, R Kumar "**A new PTC operated polygeneration system for fresh water, cooling, electricity and hydrogen production for a residential community: A Thermodynamic Assessment", 6th International Hydrogen Technologies Congress (IHTEC), January 23-26, 2022, Canakkale, Turkey.

14. Faizan Khalid, and **Rajesh Kumar** "2E Analysis of Solar Assisted Cogeneration System for Electric Power and Cooling" International Conference on Advances in Heat Transfer and Fluid Dynamics, AHTFD-22, 01st - 03th December 2022,

15. Kaushalendra Kumar Singh, **Rajesh Kumar**, Anjana Gupta. Multi-objective optimization of an ammonia based multi-stage vapour compression refrigeration system with flash intercooler cum sub-cooler. *Paper presented at*: 3rd International conference on Computational and Experimental Methods in Mechanical Engineering; 2021 Feb 11-13; Greater Noida, India.

16. Kaushalendra Kumar Singh, **Rajesh Kumar**, Anjana Gupta. Multi-objective optimization of cascade refrigeration system using $NH_3$-$CO_2$ and $NH_3$-$N_2O$ refrigerant pairs. *Paper*

*presented at*: 3rd International conference on Computational and Experimental Methods in Mechanical Engineering; 2021 Feb 11-13; Greater Noida, India.

17. Mohd Asjad Siddiqui, Abdul Khaliq, **Rajesh Kumar**. Thermodynamic analysis of exhaust waste heat recovery from turbocharged HCCI engine fueled by wet-ethanol using an Absorption Refrigeration Cycle (ARC). *Paper presented at:* 1st International conference on Technology Innovation in Mechanical Engineering; 2021 May 10-11; Bhopal, India. (https://doi.org/10.1016/j.matpr.2021.05.220)

18. Mohd Asjad Siddiqui, Abdul Khaliq, **Rajesh Kumar**. Thermodynamic investigations of a turbocharged homogeneous charge compression ignition (HCCI) engine running on wet-ethanol. *Paper presented at:* 1st International conference on Technology Innovation in Mechanical Engineering; 2021 May 10-11; Bhopal, India. (https://doi.org/10.1007/978-981-16-7909-440)

19. Mayank Singhal, **Rajesh Kumar**, R.S. Walia & S.K. Pandey 'Development of a Sintered Porous Neck Filter for miniature Joule Thomson Cryo-cooler for cooling Infrared detectors', Paper presented at International Conference in Mechanical and Energy Technology' (ICMET); 07-08 Nov'2019; Galgotia College of Engineering & Technology, Greater Noida**.**

20. Mayank Singhal, **Rajesh Kumar**, R.S. Walia & S.K. Pandey 'Thermophysics analysis of recuperative heat exchanger-based miniature J-T cooler applicable to IR devices', Paper presented at 13th International Exergy, Energy and Environment Symposium (IEEES-13); 14-17 March'2022; Umm Al-Qura University & College of Engg,, Saudi Arabia

21. Gaurav Krishnayatra, Sulekh Tokas, **Rajesh Kumar**, and Mohd. Zunaid, " 3 Dimensional CFD analysis of Laminar Flow Natural Convection of Hollor Cylinder with Annular Fins", **Proceedings of 5th World Congress of Mechanical Chemical & Materials Engg. (SCOPUS)**, 2019 **Devendra Kumar Gupta**, Rajesh Kumar, Naveen Kumar, Parametric Study of a Combined Power and Ejector Cooling Cycle using Low Temperature Heat Source, **Vth International Symposium on "Fusion of Science & Technology", New Delhi, India**, January 18-22, 2016, p.p.446-450.

22. **Rajesh Kumar**, Devendra Kumar Gupta, Thermodynamic Analysis of PTC Field Based Power and Ejector Refrigeration System, **AES-ATEMA 29th Int. Conference (Toronto, CANADA**: July 04 - 08, 2016) pp. 163 - 168.

23. **Rajesh Kumar,** Devendra Kumar Gupta, Surendra Kumar Agrawal, Exergetic performance investigation of a PTC field based integrated system for producing power

and refrigeration simultaneously**", V$^{th}$ National Conference on Refrigeration and Air Conditioning, National Institute of Technology Karnataka Surathkal**, 10$^{th}$ -12$^{th}$ May 2018.

**24.** Surendra Kumar Agrawal, **Rajesh Kumar,** D. K. Gupta**,** Energy, exergy and parametric analyses of solar thermal driven organic Rankine cycle operating with R245fa, R600, R600a and R141b as working fluids, **V$^{th}$ National Conference on Refrigeration and Air Conditioning, National Institute of Technology Karnataka Surathkal**, 10th -12th May 2018.

25. Agrawal, Surendra Kumar, **Rajesh Kumar**, and Jayaswal, Pratesh, "Energy and Exergy Analysis of Solar Thermal Driven Thermodynamic Cycle for Triple Effect Refrigeration", Proceedings of International Conference on Smart Technologies for Mechanical Engineering, 2013 October 25-26; Delhi Technological University, Delhi-42. ISBN: 978-93-83083-35-0, pp. 980-986.

## RESEARCH GUIDANCE

| **Details of Ph.D students** | | | |
|---|---|---|---|
| **S.No.** | **Name** | **Title of thesis** | **status** |
| 1 | Surendra Agrawal | ENERGY AND EXERGY ANALYSIS OF SOLAR THERMAL DRIVEN MULTIPLE OUTPUT THERMODYNAMIC CYCLE | **Awarded in RGPV Bhopal(2017)** |
| 2 | Umakant Sahoo | DESIGN AND OPTIMIZATION OF POLYGENERATION PROCESS IN HYBRID SOLAR THERMAL POWER PLANT FOR COOLING & DESALINATION" | **Awarded in DTU Delhi(2017)** |
| 3 | Devendra Kumar Gupta | THERMODYNAMIC ANALYSIS OF SOLAR OPERATED COMBINED POWER AND EJECTOR REFRIGERATION CYCLE USING ECOFRIENDLY REFRIGERANTS | **Awarded in DTU, Delhi (2018)** |
| 4 | R. Kannojia | PERFORMANCE ANALYSIS OF SOLAR-THERMAL DRIVEN ADVANCED REFRIGERATION SYSTEMS USING INTELLIGENT TECHNIQUES | **Awarded in DTU, Delhi (2020)** |
| 5 | Sunil Kumar Sinha | Study on use of Renewable Fuels in a Compression Ignition Engine | **Awarded in DTU Delhi(2020)** |
| 6 | Kaushlendra Kumar Singh | PERFORMANCE ANALYSIS AND MULTI OBJECTIVE OPTIMIZATION OF MULTI STAGE VAPOUR COMPRESSION REFRIGERATION SYSTEMS | **Awarded in DTU (2021)** |
| 7 | Mohd Asjad Siddiqui | ENERGY AND EXERGY RECOVERY FROM WET-ETHANOL FUELLED HCCI ENGINE FOR | **Awarded in DTU (2022)** |

| | | | |
|---|---|---|---|
| | | PERFORMANCE ENHANCEMENT AND AIR CONDITIONING | |
| 8 | SACHIN RANA | CFD MODELLING FOR SHAPE OPTIMIZATION OF PHASE CHANGE MATERIAL (PCM) HEAT EXCHANGER IN DOMESTIC SOLAR WATER HEATING SYSTEM | **Awarded in DTU (2023)** |
| 9 | Faizan Khalid | Thermodynamic analysis of solar based polygeneration system for a residential community | **Awarded in DTU (2023)** |
| 10 | Mayank Singhal | INVESTIGATION OF THERMOPHYSICAL ASPECTS OF INFRARED DETECTOR CRYOCHAMBER WITH CRYOCOOLING | Will be awarded soon |
| 11 | Prabhat Ranjan | THERMAL ANALYSIS AND CHARACTERIZATION OF FGM COATING USING HVOF FOR CYLINDER LINER OF I.C. ENGINE | Will be awarded soon |
| 12 | JAYESH KUMAR | THERMODYNAMIC MODELING AND EXPERIMENTAL INVESTIGATION OF PCM BASED LHTES SYSTEM WITH EMBEDDED HEAT PIPES FOR THERMAL CHARGING PERFORMANCE ENHANCEMENT | Will be awarded soon |
| 13 | Abhishek Kumar | Performance analysis of conical solar still by incorporating energy metrics and efficiency analysis" | Will be awarded soon |
| 13 | Yogendra Singh | DESIGN AND EXPERIMENTAL INVESTIGATION OF AN INNOVATIVE SOLAR DRYER-CUM-SPACE HEATING SYSTEM USING THERMAL ENERGY STORAGE | Registered in DTU Delhi (2018) |
| 14 | Vijay Shekhar | Performance Investigation of Cellulose Fiber in Building Structure for Enhancement of Thermal Insulation | Registered in DTU Delhi (2021) |
| 15 | Richa gupta | **Investigation on Thermochemical Energy Storage Material for High temperature Application** | Registered in DTU Delhi (2021) |
| 16 | Amit kumar sahu | Numerical and Experimental Assessment of Microchannel Heat Sink by BeO/Water-based Ethylene Glycol Nanofluid | Registered in DTU Delhi (2021) |

| **Details of M.Tech. students** | | | |
|---|---|---|---|
| **S.No.** | **Name** | **Title of thesis** | **status** |
| 1 | Rohit Goyal | Thermodynamic analysis of waste heat based operated steam ejector refrigeration system | Completed(2014) |
| 2 | Rahul Singh | Thermodynamic analysis of diesel engine exhaust heat operated $NH_3$-$H_2O$ refrigeration system | completed(2014) |
| 3 | Mahendra Pandey | Exergy analysis of Power plant | completed(2014) |
| 4 | Santosh Kumar | Design and Simulation of Portable Solar Distillation System and Domestic hot water in Co-generation Process | completed(2015) |

| | | | |
|---|---|---|---|
| 5 | Saurabh | Thermodynamic analysis of Air conditioning system using waste heat of steel plant | completed(2015) |
| 6 | Mayank Kumar | CFD analysis of two phase flow inside a horizontal tube | completed(2015) |
| 7 | Chandra Shekharsom | Thermodynamic analysis of power generation using waste heat of cement and steel plant | completed(2016) |
| 8 | Sajal Gupta | Evaluation of Energy and Exergy Performance of a Cryogenic Air Separation Plant for generating Liquid Oxygen : A Case Study | completed(2016) |
| 9 | KanavVij | Designing of Mechanism for Multi-Axis Sun Tracking System | completed(2016) |
| 10 | Sachin | MODELLING OF TRIPLE PRESSURE-REHEAT AND SUPPLEMENTARY FIRED COMBINED CYCLE POWER PLANT USING GT PRO | completed(2016) |
| 11 | Abhishek | Analysis of Wind Turbine Power Generation For Different Turbine Rotors | completed(2016) |
| 12 | Ashish Yadav | Designing of A Solar Concentrator Based Mechanical Process Heat Applications In Hospitality Industry | completed(2017) |
| 13 | Vivek Hans | Estimation of Power Generation Capacity of Non Woody Biomass and Coal Biomass Mixed Fuel Samples and Their Energy Values | completed(2017) |
| 14 | Vikas Kumar Tomar | Feasibility Study of Concentrated Solar Thermal Steam Cooking System: An Application In DTU Hostel | completed(2017) |
| 15 | Piyush Raj | Investigating The Scaling Effects On Blade Structural Characteristics Of Wind Turbine Using Cfd Simulation | Completed (2018) |
| 16. | Jitendra Yadav | Thermo-Physical Modelling Of Powder Mixed Near Dry Edm Process | Completed (2018) |
| 17. | Amit Sheoran | Analytical Simulation And Fabrication Of Compressed Air Driven Engine Using four-stroke SI Engine | Completed (2018) |
| 18 | Saurabh Anand (2K17/THE/14) | Comparative analysis of Thermodynamics performance of Cascade Refrigeration system for refrigerant Couple R23/R290 and R23/R600A | Completed (2019) |
| 19 | Gaurav Krishnayatra | Thermal Hydraulic Modelling of Intermediate Heat Exchanger used in Liquid Metal Cooled Nuclear Reactor | Completed (2020) |
| 20 | Vijay Shekhar Sharma | Fabrication of cellulose fibre for thermal insulation using paper waste | Completed (2020) |
| 21 | Pankaj Kumar | Experimental Study on wire mesh based flat plate collector | Completed (2022) |

| | | | |
|---|---|---|---|
| 22 | AKITA SUKHDAVE (2K19/THE/01) | COMPARATIVE ENERGY AND EXERRGY ANALYSIS OF ORC-VCR AND MODIFIED ORC-VCR CYCLE USINGDIFFERENT WORKING FLUIDS | Completed (2022) |
| 23 | Mahendra Kumar Arya(2K20/THE/25) | Energy and Exergy Analysis of Ground Source Heat Extraction Technology in India | Completed (2022) |
| 24 | AYUSH SARASWAT (2K20/THE/06) | Performance analysis of solar chimney power plant (SCPP) : A CFD approach | Completed (2022) |
| 25 | HARSH VERMA (2K20/THE/11) | Thermodynamic assessment of s-$CO_2$ Brayton cycle integrated with cascaded LiBr-$H_2O$ and Trans-$CO_2$ Vapour Absorption Refrigeration for waste heat recovery of Gas turbine Engine | Completed (2022) |

## INVITED LECTURES AND CHAIRMANSHIPS AT NATIONAL OR INTERNATIONAL CONFERENCE/ SEMINARS

| S. No. | Title of Lecture/ Academic Session | Title of Conference/ Seminar with date (s)etc | Organized by | Whether International/ National/State |
|---|---|---|---|---|
| **1** | **Thermodynamics of Multi-effect vapor absorption refrigeration system** | **International workshop on HVAC&R, 24-28 March 2023** | **AMU- Aligarh** | **International** |
| **2** | **Advanced Energy Technologies for Sustainable Development (Keynote speaker)** | **International Conference on Advancements in Interdisciplinary Research (AIR-2022)-Smart and Sustainable Society-6-7 May 2022** | **MNNIT- Allahabad** | **International** |
| 3 | **Development and challenges of HCCI Engine along with Performance Enhancement and Air Conditioning** | **ALTERNATIVE ENERGY SOURCES FOR SUSTAINABLE DEVELOPMENT(** January 3 – 14, 2022,) | Delhi Technological University | |
| 4 | HYBRID SOLAR AND BIOMASS SYSTEM FOR POWER, COOLING & DESALINATION | Technology Innovations in Mechanical Engineering 2021(TIME-2021)(Key note speaker) | Sagar Institute of Science and Technology Gandhi Nagar Bhopal Bhopal (755), India, April 12-13, 2021 | International |
| 5 | Renewable energy: a review | Two weeks short term course on "Thermodynamics and its applications to solar energy systems design" 9-18 March, 2019 | MITS, Gwalior | National |
| 6. | Recent applications of solar energy-Key note speaker | Recent advancement in mechanical engineering | Delhi college of technology and | National |

| | | | | |
|---|---|---|---|---|
| | | | management, Palwal (Haryana) | |
| 7. | Fluid dynamics and CFD | Advances in chemical Engineering | MITS, Gwalior | National |
| 8. | Modelling of thermal systems | Modeling and Simulation of Dynamical Systems and Optimization (June 9 –June 13, 2014) | Delhi Technological University(TEQIP-II) | National |
| 9 | Applications of solar energy for power generation | Renewable Energy and Alternative Fuels(REAF-2014)" | Delhi Technological University (TEQIP-II) | National |

**Reviewer:** Active reviewer of many reputed Journals of ASME, Elsevier, Springer, Taylor and Francis, Inderscience etc.

**CONFERENCE AND FDP ORGANIZED:**

1. Joint organizing secretary of STME-2013(INTERNATIONAL CONFERENCE)
2. Co-Coordinator of "Modeling and Simulation of Dynamical Systems and Optimization (MSDSO-2014)" June 9 –June 13, 2014
3. Co-Coordinator of "Renewable Energy and Alternative Fuels (REAF-2014) June 16 – June 20, 2014
4. Co-Coordinator of "Precision Manufacturing: Technology for Better Tomorrow (PMTBT-14) "July 14 – July 18, 2014.

**SUBJECTS TAUGHT:**

1. Advanced Fluid Mechanics (PG)
2. Fluid Mechanics (UG)
3. Heat & Mass Transfer (UG)
4. Refrigeration and Air-Conditioning (UG)
5. Thermodynamics (UG)
6. Energy conservation and efficiency (PG)
7. Solar energy (PG)
8. Power plant Engineering (UG &PG)
9. Engineering Mechanics (UG)
10. Engineering Graphics (UG)

**OTHER INFORMATION**

- **Life time member of Solar Energy Society of India**
- **Fellow of The Institution of Engineers(INDIA)**

(Prof. Rajesh Kumar)
Professor
Mech Engg Dept
DTU, Delhi