

Jnana Ranjan Senapati

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Research interest

Computational Fluid Dynamics, Natural convection, Conjugate heat transfer, Interface tracking (Level set, VOF), Multiphase flow, Non-Newtonian fluid flow, IRS Device

Academic profile

| Courses | University/ Institution | Year of passing | Specialisation | % of marks obtained/CGPA |
|------------------|--|-----------------|---------------------------------|--------------------------|
| Ph. D. | Indian Institute of Technology Kharagpur | 2016 | Fluid Flow and Heat Transfer | - |
| M. Tech. | Indian Institute of Technology Kharagpur | 2011 | Thermal Science and Engineering | 8.29/10 |
| B. Tech. | Veer Surendra Sai University of Technology, Odisha | 2009 | Mechanical Engineering | 8.42/10 |
| Higher Secondary | Council of Higher Secondary Education, Odisha | 2004 | Science | 70.33 % |
| Secondary | Board of Secondary Education, Odisha | 2002 | - | 83.07 % |

Thesis

Ph. D. research work

Thesis title: Natural convection heat transfer from horizontal and vertical cylinder with annular fins[†]

Supervisor(s): Prof. Subhransu Roy and Prof. Sukanta Kumar Dash

M. Tech. project

Thesis title: Numerical modeling of fluid flow and heat transfer for square cavity and cylindrical enclosure[†]

Supervisor(s): Prof. Subhransu Roy and Prof. Sandipan Ghosh Moulic

Design project: A study on gas turbine blade cooling

†Please see the annexure for a brief summary of research work

Publications

Publications based on PhD work:

- Journals** J. R. Senapati, S. K. Dash, S. Roy, Numerical investigation of natural convection heat transfer over annular finned horizontal cylinder, *International Journal of Heat and Mass Transfer*, 2016, Volume 96, Pages 330-345.
- J. R. Senapati, S. K. Dash, S. Roy, 3D numerical study of the effect of eccentricity on heat transfer characteristics over horizontal cylinder fitted with annular fins, *International Journal of Thermal Sciences*, 2016, Volume 108, Pages 28-39.
- J. R. Senapati, S. K. Dash, S. Roy, Numerical investigation of natural convection heat transfer from vertical cylinder with annular fins, *International Journal of Thermal Sciences*, 2017, Volume 111, Pages 146-159.
- J. R. Senapati, S. K. Dash, S. Roy, Entropy generation in laminar and turbulent natural convection heat transfer from vertical cylinder with annular fins, *ASME Journal of Heat Transfer*, 2017, Volume 139, Pages 042501 (13 pages)
- J. R. Senapati, S. K. Dash, S. Roy, Three-dimensional numerical investigation of thermodynamic performance due to conjugate natural convection from horizontal cylinder with annular fins, *ASME Journal of Heat Transfer*, 2017, Volume 139, Page 082501 (7 pages).

Books Published:

- J. R. Senapati, S. K. Dash, S. Roy, "Natural convection heat transfer from horizontal cylinder with annular fins", *Lambert Academic Publishing House*, 2017, ISBN: 978-3-330-03050-3.
- J. R. Senapati, S. K. Dash, S. Roy, "Natural convection heat transfer from vertical cylinder with annular fins", *Lambert Academic Publishing House*, 2017, ISBN: 978-3-330-06087-6.

Projects:

Project titled "Fluid flow and heat transfer analysis of various types of IRS device: A comparative study" sponsored by **Science and Engineering Research Board (SERB)**, DST, Govt. of India in the Early Career Research Award category is **on-going**.

Extra-curricular activities

- Actively participated in the organization of 22nd National and 11th **ISHMT-ASME Heat and Mass Transfer Conference**, IIT Kharagpur, India, December 28-31, 2013.
- Actively participated in the organization of 9th **All India Students' Conference on Science and Spiritual Quest (AISSQ-2015)**, IIT Kharagpur, India, 30 October to 1 November, 2015.

Training programs

- Industrial training of one month in Central Tool Room and Training Center, Bhubaneswar (**Designing and manufacturing of a hand injection mould**)
- One-month vocational training in **PRO-E software** at Central Tool Room and Training Center, Bhubaneswar

Computer skills

- Programming Language: FORTRAN
- Application Package Known: ANSYS Fluent, Pro E, Tecplot, EES, Polymath, Gambit, ANSYS Workbench
- Operating Systems: Linux, Windows
- Word processor: MS Office, Lyx

Personal Information

Date of Birth: Dec 30, 1986
Fathers name: Dr Narayan Senapati
Place of residence: Bhadrak, Odisha
Marital status: Married
Nationality: Indian
Languages known: Odia, Hindi, and English

References

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Date: 08th March, 2018

Place: Kharagpur

Jnana Rajan Senapati

ANNEXURE: A BRIEF SUMMARY OF RESEARCH WORK

I. (Ph.D.) Natural convection heat transfer from horizontal and vertical cylinder with annular fins

Natural convection heat transfer from horizontal and vertical cylinder with annular fins has been studied numerically. The numerical investigation is able to capture a complete picture of natural convection over a finned cylinder from where easy visualization about the plume structure and flow field over the fin-tube array can be obtained pictorially. In the present research, numerical simulations of full Navier-Stokes equation along with the energy equation have been conducted for the conjugate heat transfer problem. The effect of the pertinent input parameters like fin to tube diameter ratio, fin spacing and Rayleigh number on Nusselt number are analyzed and correlations for average Nusselt number has been developed for natural convection from a finned cylinder. We have also investigated the effect of fin eccentricity on heat transfer characteristics over horizontal cylinder with annular fins. In addition to the heat transfer study, a detailed study on entropy generation around the fin-tube configuration has also been studied.

II. (M. Tech.) Numerical modeling of fluid flow and heat transfer for square cavity and cylindrical enclosure

A computational study of natural convection flow and heat transfer phenomena in 2D square cavity and axisymmetric cylindrical enclosure has been carried out here. The governing differential equations have been solved using a control volume approach with primitive variable formulation. SIMPLE iterative algorithm with staggered grid method has been used for the FORTRAN 90 programming.