RESUME

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OBJECTIVE

A challenging growth oriented position, where my skills can be effectively utilized and improved eventually leading to contribution in the growth of the organization.

EXPERIENCE SUMMARY

- Working as a Assistant Professor at Mechanical Engineering Department in **SDM College of Engineering & Technology, Dharwad** from **October-2008 to till date**.
- Worked as a Lecturer at Mechanical Engineering Department in **Dayananda Sagar College of Engineering Davangere** from **Sept-2007 to Jan-2008**.
- Worked as a Contract Engineer in **GTRE** (DRDO unit) Bangalore., in Combustion-CFD division from **Sept-2006 to July 2007.**
- Worked as Project Assistant at the Center for Cryogenic Technology, **Indian Institute of Science Bangalore** from **June-2006 to Sept-2006**.
- Worked as a Project Trainee in the area of Computational Fluid Dynamics from Aerospace Department, Indian Institute of science (**IISc**),Bangalore during **July 2005 to September 2006**.

ACADEMICS

- **Ph. D (Thesis submitted)**

  Bhabha Atomic Research Centre, Mumbai

  Homi Bhabha National Institute, Mumabi

- **M.Tech in Thermal Engineering** (2004-2006)

  University B.D.T college of Engineering, Davangere -04.

  Percentage =75.72%

- **B.E** in Mechanical Engineering (1997 – 2001)

University B.D.T college of Engineering, Davangere -04.

Percentage =66.44%.

P.hD Research work

Title of the research work: **Investigation on the natural circulation characteristics of molten salt natural circulation loop**

University: **Homi Bhabha National Institute, Mumbai**

Organization: **Bhabha Atomic Research Centre, Mumbai**

Nature of research work: **Experimental and computational**

Software's used: **FLUENT, PHOENICS, FORTRON, C**

Abstract

High Temperature Reactors (HTR) and solar thermal power plants use molten salts as a coolant/heat transfer fluid. Molten salts have comparatively low melting point and high boiling point at low pressure. This is highly desirable because a high temperature system can be designed without increasing system pressure. Hence design and operation of molten salt based system gets simplified. Natural circulation of molten salt is being preferred in some systems like solar thermal power plant or molten salt fast breeder reactor. Such systems can be studied with the help of a natural circulation loop.

Natural circulation loops are representative of primary heat transport system of nuclear reactor and other facilities working on natural circulation flow. Natural circulation phenomenon has been used in many engineering applications such as, solar water heaters, transformer cooling, geothermal power extraction, cooling of internal combustion engines, gas turbine blades, computer cooling and nuclear reactor cores. A Natural Circulation Loop (NCL) consists of a heater and cooler connected by piping. The heater is placed at lower elevation than the cooler. As a consequence of the heat flux, the heated part of the fluid becomes lighter and rises up, while the cooler part becomes denser and drops down due to gravity. These combined effects establish natural circulation of fluid in the loop. Thus, the motive force for the flow in NCL is generated simply because of the presence of the heat source and heat sink, without need of any external force. The absence of moving/rotating parts to generate the motive force for flow makes it less prone to failures. Also maintenance and operating costs are reduced. Hence the heat removal/transfer by natural circulation system takes the most attention. In view of this, molten salt natural circulation loop has been installed to study heat transfer capability of molten salt and also to understand the steady state and transient thermal-hydraulic behaviour of molten salt natural circulation loop.

Experimental and computational investigations of natural circulation loop with water are published previously. These available experimental data are used to validate the CFD model and also to understand the thermal-hydraulic behaviour of natural circulation loop working with water. Hence, the rectangular natural circulation loop working with water is also simulated using 3D CFD software. The CFD results are compared with available experimental data and correlations to validate the CFD models. The promising results obtained from CFD simulation are used to explain the reason behind the uni-directional and bi-directional oscillations occurs in the horizontal cooler and horizontal heater configurations of the natural circulation loop. This is one of the novel contributions of this thesis.

Transient 3D CFD simulation of the molten salt natural circulation loop is carried out. The experimental data generated on molten salt natural circulation loop are used to validate the CFD model, whereas the computed data are useful to know the design parameter of molten salt reactor and also for solar power plant. Various transient computational studies such as (i) flow initiation transients, (ii) power rising from steady state transients, (iii) power step back transients, (iv) heater trip transients and (v) loss of heat sink transients are performed to understand the thermal-hydraulic behavior of the loop at different operating conditions and various orientations of heater and cooler. Further, the heat transfer study on molten salt natural circulation loop has been carried out. The steady state heat transfer characteristics shows good match with Boelter's mixed convection correlation. Effect of developing length on heat transfer has been studied. The transient unsteady heat transfer characteristics are also studied and the unique heat transfer characteristic in the oscillatory flow has been explained in the thesis.

M. Tech Project

Title : A Novel Multidimensional Relaxation Scheme for Hyperbolic Conversation Laws.

Organization: Indian Institute of Science, Bangalore.

Language Used: C

Description : In the field of CFD, the two basic difficulties in solving inviscid compressible flows are nonlinearity and multidimensionality, which make algorithm development very challenging. While tackling these challenges many numerical schemes are developed, like Flux splitting method, Reimann solvers, Kinetic theory based methods and Relaxation schemes. The relaxation schemes are the simplest one.

The aim of the new relaxation scheme presented in this Project is to present the better multidimensional approximation by getting the foot of the characteristic in all the four quadrants and to get information from all the nearest neighbouring points in multidimensional problems. The new relaxation scheme is tested on various Benchmark problems, for scalar conservation [Burger's equation] and vector conservation equations [Euler equation] in 1-D and 2-D. The Novel Multidimensional relaxation scheme is found to be less dissipative than the Method of interpolation with relaxation approximation scheme (MIRACL).

Role: Development of new scheme and Validation of the new scheme.

Training undergone:

Undergone Training in CFD Centre, Aerospace Department, Indian Institute of Science Bangalore.

TECHNICAL SKILLS

Modeling packages : Auto CAD. Catia V5

Word Processing Applications: MS Office, LATEX.

Meshing packages : ICEM CFD, GAMBIT

Analysis packages : Ansys CFX 10.0, FLUENT , PHOENICS, OpenFOAM

PERSONAL DETAILS

Father's name : Yallappa Kudariyavar

Date of birth : 17-05-1979

Marital status : Single

Permanent Address : S/o Yallappa Kudariyavar
Kondoji, Shadaguppi Post,
Hangal Tq, Haveri Dist
Karnataka, India-581102

Languages : English, Kannada, and Hindi.

Strengths : Goal-oriented, hard working, dedicated and confident.

Areas of Interest

1. Computational Fluid Dynamics, Thermodynamics, Cryogenics.
2. Fluid Mechanics, Heat Transfer.
3. Research in Thermal Sciences, Gas Turbines.

Publications

International Journals

1. Jayaraj Yallappa Kudariyawar, Abhijeet Mohan Vaidya, Naresh Kumar Maheshwari, Polepalle Satyamurthy, Computational study of instabilities in a rectangular natural circulation loop using 3D CFD simulation, **International journal of Thermal Sciences**, 101 (2016), 193-206. http://dx.doi.org/10.1016/j.ijthermalsci.2015.11.003

2. Jayaraj Yallappa Kudariyawar, Abhishek Kumar Srivastava, Abhijeet Mohan Vaidya, Naresh Kumar Maheshwari, Polepalle Satyamurthy, Computational and Experimental Investigation of Steady state and Transient Characteristics of Molten Salt Natural Circulation Loop, **Applied Thermal Engineering,** 99 (2016), 560-571, http://dx.doi.org/doi:10.1016/j.applthermaleng.2015.12.114

3. A. K. Srivastava, Jayaraj Y. Kudariyawar, A. Borgohain, N. K. Maheshwari, P. K. Vijayan, Experimental and theoretical studies on the natural circulation behaviour of molten salt, **Applied Thermal Engineering,** 98 (2016), 513-521. http://dx.doi.org/doi:10.1016/j.applthermaleng.2015.12.065 .

4. J. Y. Kudariyawar, A. M. Vaidya, N. K. Maheshwari, P. Satyamurthy, A. K. Srivastava, Estimating Steady state and Transient characteristics of Molten Salt Natural Circulation Loop using CFD, **KERNTECHNIK** 80 (1) (2015), 20-31. DOI 10.3139/124.110478

5. Jayaraj Yallappa Kudariyawar, Abhijeet Mohan Vaidya, Naresh Kumar Maheshwari, Polepalle Satyamurthy, Abhishek Kumar Srivastava and Babulu Mohan Lingade, Investigation on heat transfer behaviour of molten salt natural circulation loop using numerical simulations, **Journal of Nuclear Energy Science and Power Generation Technology**, 5:5 (2016), DOI: 10.4172/2325-9809.1000165

International Conferences

1. Jayaraj Yallappa Kudariyawar, A. M. Vaidya, N. K. Maheshwari and P.K.Vijayan, Steady State Characteristics and Flow Initiation Transients of Molten Salt Natural Circulation Loop, In the Proceedings of the national conference on molten salt nuclear technology (CMNST), 199-203, January 9-11, 2013, BARC, Mumbai.

2. Jayaraj Y Kudariyawar, A. M. Vaidya, N. K. Maheshwari, P. Satyamurthy, P. K. Vijayan, Computation of flow transients in molten salt natural circulation loop using PHOENICS, In the Proceedings of 22nd National and 11th International ISHMT-ASME Heat and Mass Transfer Conference, Paper Number HMTC1300640, December 28-31, 2013, IIT Kharagpur, India

3. Jayaraj Y Kudariyawar, A. M. Vaidya, N. K. Maheshwari, P. Satyamurthy, Computational study of flow in rectangular natural circulation loop using 1D and 3D simulations, In the Proceedings of 5th International and 41st National Conference on Fluid Mechanics (FMFP-2014), Paper Number – 155, December 12-14, 2014, IIT Kanpur, India.

4. Jayaraj Y Kudariyawar, A. M. Vaidya, N. K. Maheshwari, P. Satyamurthy, Steady state and Transient Heat Transfer on Molten Salt Natural Circulation Loop, Paper submitted for the Proceedings of 6th International and 43rd National Conference on Fluid Mechanics (FMFP-2016), Paper Number – 77 (**accepted for oral presentation**).

National conferences

1. Jayaraj Yallappa Kudariyawar, Abhijeeth Mohan Vaidya, N. K. Maheshwari and P. K. Vijayan, "3D CFD Simulation of molten salt natural circulation loop", In the Proceedings of 39th national conference on Fluid Mechanics and Fluid Power, NCFMFP2012-101, December 13-15, 2012, SVNIT Surat.

2. Jayaraj Y Kudariyawar, A. M. Vaidya, N. K. Maheshwari, P. Satyamurthy, "Investigation of flow and heat transfer characteristics of molten nitrate salt in a pipe using CFD simulations", In the Proceedings of National conference on Thorium: Present status and future directions, December 22-24, 2014, BARC Mumbai, India.
3. Jayaraj Y Kudariyawar, K. A. Sateesh, K. Gopinath, D. S. Bhat, Fluid flow and heat transfer characteristics of molten salt in a horizontal pipe using numerical simulation, In the Proceedings of National conference on Progresses and Researches in Mechanical Engineering (PRIME -2016), September 9, 2016, SDM College of Engineering & Technology, Dharwad, Karnataka.

References

1) Dr. N.K. Maheshwari

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Declaration:

I hereby declare that the above written particulars are true to the best of my knowledge and belief.

Place: Dharwad

Date: 14-04-2017

(**Jayaraj Y K)**