Vignesh Vaikundaraman

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Bachelor Thesis

Feb 2019 – June 2019 **Topology and Stochasticity of Turbulent Magnetic fields: A Numerical Investigation**

Supervisor Prof Dr.Ethan Vishniac, Research Professor, Johns Hopkins University, Baltimore, MD, USA

- Numerical implementation and validation of formulation of topology and stochasticity of turbulent magnetic fields.
- Formulation numerically tested and proved for phenmonena like Magnetic reconnection and Richardson diffusion in magnetohydrodynamic turbulence for a box of incompressible MHD data with periodic boundary conditions
- Tools: MATLAB, Mathematical Methods

Education

July 2015 – June 2019 **(B.Tech) Mechanical Engineering**, *SASTRA Deemed University, India*, Grade 7.47/10.

Key Courses 1. Advanced Fluid Mechanics, Thermodynamics and Heat Transfer, Quantum Mechanics, Electrical Sciences, Computational Fluid Mechanics, Solid state Physics, Mathematics, C++, Engineering Physics laboratory

June.2014 – May.2015 **Senior Secondary School Leaving cerificate**, *CBSE*, India, Percentage: 91.8%.

Key Courses 1. Physics, Mathematics, Chemistry, Computer Science

Research Experience

Feb 2019 – June 2019 **Research Student**, *Johns Hopkins University*, Baltimore, USA.

- **Topology and Stochasticity of Magnetic Fields: A numerical investigation** (Ref: Bachelor's Thesis)
- Supervisor: Dr Ethan Vishniac, Research Professor, Department of Physics & ASTronomy, Johns Hopkins University, USA

Nov.2018 – Jan 2019 & May.2018 – July.2018 **Research Intern**, *Indian Institute of Science Education and Research(IISER)*, Tirupati, India.

- **Study of Binary star cluster IC1848** (Ref: Research Projects)
- Supervisor: Dr Jessy Jose, Assistant Professor, Department of Physics, IISER, Tirupati, India

May.2017 – July 2017 **Project Trainee**, *Caterpillar Private Ltd*, Chennai, India.

- Design of Jigs and Fixtures for convectional drilling machines for a possibilty of reduction of total time.
- Modification plant layout for a better flow of raw materials and end products.
- Tools: AutoCAD, PTC CREO, MS Excel.

Research Projects

May.2018 – Jul.2018 & Nov.2018 – Jan.2019 **Study of Binary star cluster IC1848**

- Photometric data from surveys like NEWFIRM, PanSTARRS, 2MASS and Spitzer(Optical, Near Infrared and Far Infrared data) were used to analyse the binary star cluster IC1848 also known as soul nebula.
- VOSA (Virtual Observatory SED Analayzer)was used to obtain the HR diagram for the data.
- Further analyses were done on the data in Python to obtain basic properties like average age, mass and radial distances.
- Distances were obtained from the GAIA DR2 and validated with the present values.
- Results were used to resolve the cluster into two based on the binary star system in the region.
- Tools: Python, MS Excel, VOSA, IRAF

Jul.2018 – Nov.2018 **Analysis of Airflow generated by a ceiling fan system**

- Experimental setup was designed and fabricated to test the flow efficiency of a set of fans in a room. Pitot tubes were used to measure the flow of air.
- Obtained data was analysed statistically in Python to map the flow of air due to a set of fans in a room.
- Tools: Experimental Methods,Python, MS Excel

Sep.2017 –Jan 2018 **Experimental Analysis of Implementing Roughness on NACA 0018 Airfoil**

- Results demonstrate an effective increase in stalling angle of NACA 0018 Airfoil by 4°
- Tools and Techniques: Design and development of experimental methods using a subsonic wind tunnel, statistical analysis in MS Excel

Other Projects

Instrumentation of Radio Telescope to observe the Sun

- A small radio telescope setup was built to observe the radio image of the Sun using a dish receiver.

RC Airplane

- A radio controlled Airplane was desgined for the SAE Aerodesign Challenge
- The designed plane can carry a payload of 10"x4"x4" volume with a maximum weight of 5 kilograms
- Tools: ANSYS, PTC CREO, MS Excel

Simulation of Primordial Universe Formation

- The Image of the Cosmic Microwave Background was taken and using video editing techniques from the Adobe After Effects Software, gravity was crudely simulated.

Extra Curricular Achievements

- Won the second place in " Junkyard Wars " in Indian Institute of Technology, Madras
- President of the Astronomy club of SASTRA University. Conducted various events and talks through the same. Link:SEDS SASTRA Blog
- Learning Violin for the past 15 years. Passed the Certificate Exam in Violin from Potti Sreeraamulu Telugu University and part of fusion band "Epitone".
- Part of the Physics Club of SASTRA Deemed University

Language

Deutsch	A1	*Goethe-Institut Trichy, India*
English	Fluent	*TOEFL 107/120, GRE Verbal 152/170*
Tamil	Mother Tongue	
Telugu	Mother Tongue	

Publications

E. Livya, Sai Anirudh R., Vignesh V., Prasannavenkatesh B., Nadaraja Pillai S., *"Experimental Analysis of Implementing Roughness on NACA 0018 Airfoil"* in the Lecture Notes in Mechanical Engineering Springer, 2018.

Amir Jafari, Ethan Vishniac, Vignesh Vaikundaraman., *"Statistical Analysis of Stochastic Magnetic field"* submitted to the Physical Review E

Amir Jafari, Ethan Vishniac, Vignesh Vaikundaraman., *"Magnetic Stochasticity and Diffusion"* submitted to the Physical Review E

Test Scores

Graduate Record Examination(GRE): 320/340 Quants: 168/170, Verbal:152/170, AWA: 4.0/6

TOEFL: 107/120 Listening: 29/30, Reading: 28/30, Writing: 27/30, Speaking: 23/30

References

Supervisor	Dr. Ethan Vishniac	*Research Professor, Johns Hopkins University,USA, evishni1@jhu.edu*
Supervisor	Dr Jessy Jose	*Assistant Proffessor, IISER Tirupati, India, jessy@iisertirupati.ac.in*