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Notice for the PhD Viva Voce Examination

Ms Noor Arshika S (Registration Number: 2090228), PhD scholar at the School of Sciences, CHRIST (Deemed to be University), Bangalore will defend her PhD thesis at the public viva-voce examination on Friday, 28 June 2024 at 11.30 am in Room No. 044, Ground Floor, R & D Block, CHRIST (Deemed to be University), Bengaluru - 560029.

Title of the Thesis	:	**Study of Rayleigh-Bénard Dynamical System Involving Newtonian and Nanofluids in Rectangular and Cylindrical Enclosures**
Discipline	:	**Mathematics**
External Examiner (Outside Karnataka)	:	**Dr Rajesh Kumar Pandey** Associate Professor Department of Mathematical Sciences Indian Institute of Technology Varanasi, Uttar Pradesh
External Examiner (Within Karnataka)	:	**Dr Nagaraj N Katagi** Professor Department of Mathematics Manipal Institute of Technology Manipal – 576104 Karnataka
Supervisor	:	**Dr Sameena Tarannum** Assistant Professor Department of Professional Studies School of Commerce, Finance and Accountancy CHRIST (Deemed to be University) Bengaluru–560029 Karnataka

The members of the Research Advisory Committee of the Scholar, the faculty members of the Department and the School, interested experts and research scholars of all the branches of research are cordially invited to attend this open viva-voce examination.

Registrar

Place: Bengaluru
Date: 26 June 2024

ABSTRACT

Analyzing fluid flow behavior in the presence of temperature gradients subjected to internal and external forces in different geometries is essential for optimization processes for various engineering applications, guiding the design of more efficient thermal systems. This thesis focuses on investigating the Rayleigh-Bénard convection problems occupying rectangular and cylindrical enclosures. The linear and weakly nonlinear analyses are carried out that reveal the results on regular convection, heat transport and chaotic motion for each of the problems. Steady and unsteady states of the Rayleigh-Bénard system are studied using the Lorenz model. The dynamical system is investigated to look for possible chaotic motion.

Fluid systems can exhibit chaotic behavior, and understanding the chaotic nature of these flows is essential for accurate predictions of their evolution over time. In view of this, the regular, chaotic, and periodic natures of the dynamical system is thoroughly analyzed. Further, the influence of various parameters on the indicators of chaos is explored. Additionally, the thermal performance of the system is looked into by introducing nanoparticles/nanotubes into the base fluid.

Keywords: Rayleigh-Bénard convection, rectangular enclosure, cylindrical enclosure, boundary conditions, Fourier-Galerkin, Maclaurin series, Runge-Kutta method, Lorenz system, nanofluids, nanoparticles, nanotubes, heat transport, chaos

Publications:

1. **Noor Arshika S**, P.G. Siddheshwar and Sameena Tarannum, "Rayleigh-Bénard magnetoconvection with asymmetric boundary condition and comparison of results with those of symmetric boundary condition", *Journal of Thermal Analysis and Calorimetry*, vol. 148, pp. 7333-7356, 2023.
2. **Noor Arshika S**, P.G. Siddheshwar, Sameena Tarannum and Kanchana C, "Impact of boundary conditions on Rayleigh-Bénard convection: stability, heat transfer and chaos", *International Journal of Ambient Energy*, vol. 45, pp. 2304713, 2024
3. P.G. Siddheshwar, **Noor Arshika S**, Sameena Tarannum and Laroze D, "Study of chaos in Rayleigh-Bénard magnetoconvection of a weakly electrically conducting Newtonian liquid in shallow cylindrical enclosures", *Chaos, Solitons & Fractals*, vol. 182, pp. 114853, 2024.