

Ashwin Joy

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Personal

Born on April 30, 1981.

India Citizen.

Education

Ph.D. Physics, Institute for Plasma Research, Gandhinagar, Sep 2006 - July 2011 (to be submitted).
Title: "Molecular Dynamics Simulations of Coherent Structures in Strongly Coupled Yukawa Liquids".
Advisor: R. Ganesh

Junior Research Fellow, R.R.C.A.T, Indore, India, Nov 2004 - May 2006.

M.Sc. Physics, Dept. of Physics, Gujarat University, Ahmedabad, India, 2002-2004.

B.Sc. Physics, St. Xaviers College, Gujarat University, Ahmedabad, India, 1999-2002.

Research Interests

Molecular dynamics studies on strongly coupled Yukawa liquids such as "dusty plasmas".

Flow instabilities and turbulence modelling in classical/generalized hydrodynamics using pseudo-spectral methods.

Interested in Monte-Carlo methods and Particle in Cell (PIC) simulation of basic plasma phenomena.

Journal Publications

1. **Ashwin J.** and R. Ganesh, "Formation and interaction of dipolar vortices in strongly coupled liquids", (Submitted).
2. **Ashwin J.** and R. Ganesh, "Coevolution of inverse cascade and nonlinear heat front in shear flows of strongly coupled Yukawa liquids", Phys. Plasmas. (Accepted).
3. **Ashwin J.** and R. Ganesh, "Coherent vortices in strongly coupled liquids", Phys. Rev. Lett. (**106**), 135001 (2011).
4. **Ashwin J.** and R. Ganesh, "Parallel shear flow instabilities in strongly coupled Yukawa liquids - A comparison of generalized hydrodynamic model and molecular dynamics results", Phys. Plasmas (**17**), 103706 (2010).

5. **Ashwin J.** and R. Ganesh, "Kelvin-Helmholtz instability in strongly coupled Yukawa liquids", Phys. Rev. Lett. (**104**), 215003 (2010).
6. **Ashwin J.** and R. Ganesh, "Effect of external drive on strongly coupled Yukawa systems : A nonequilibrium molecular dynamics study", Phys. Rev. E. (**80**), 056408 (2009).

Conference Publications

1. **Ashwin J.** and R. Ganesh, "Kolmogorov Flows in Strongly Coupled Plasmas - A Molecular Dynamics Study", To be presented at the 22nd International Conference on Numerical Simulation of Plasmas, Sep 7-9, 2011, Princeton Plasma Physics Laboratory, Princeton, NJ, USA.
2. R. Ganesh and **Ashwin J.**, "Shear Flows in Two Dimensional Strongly Coupled Yukawa Liquids : A Large Scale Molecular Dynamics Study", 6th International Conference on the Physics of Dusty Plasmas, May 16-20, 2011, Garmisch-Partenkirchen, Germany.
3. **Ashwin J.**, R. Ganesh and M. Warriar, "Calculation of transport coefficients using non-equilibrium molecular dynamics (NEMD)", 22nd National Symposium on Plasma Science & Technology, Nov 2007, Ahmedabad, India.

Programming Skills

C, Python, C++, Fortran and GNU/Linux shell scripting languages.

Scientific libraries: FFTW, SciPy and Matplotlib.

Distributed parallel programming via Message Passing Interface (MPI) library.

Shared memory parallelism via OpenMP.

CUDA programming for developing high performance codes on NVIDIA GPU cards.

Codes written

MPMD Multi-Potential Molecular Dynamics code, a parallel MPI-based molecular dynamics code written in C for simulating Yukawa, Lennard-Jones and Carbon systems.

MPMD-PyUtils A collection of python scripts for numerical post-processing of MPMD output data.

movieGL An OpenGL-based C code to visualize the particle trajectories in real time.

SG-Hydro Screened generalized hydrodynamic code, a massively parallel MPI based pseudo-spectral code designed to model turbulence in a screened generalized hydrodynamic model. The code is written in C and parallel Fourier transforms are implemented using FFTW library to achieve performance.

Schools & Workshops Attended

1. Advanced School in High Performance and GRID computing at The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy from November 3-14, 2008.

2. EUIndia Grid Workshop on Material, Earth and Atmospheric Sciences at C-DAC, Pune, India from September 24-28, 2007.

Last updated: June 13, 2011