CONTRIBUTED TALKS: TITLE AND ABSTRACTS

Sagar Gautam: June 3, 2024 (4:00 - 4:30 pm IST)

Title: Optimal stopping time and infinite horizon problems for 2D stochastic convective Brinkman-Forchheimer equations

Abstract: In this work, we consider the following 2D stochastic convective Brinkman-Forchheimer (SCBF) equations in a bounded smooth domain $\mathcal{O}$:

$$\mathrm{d}\boldsymbol{u} + \left[-\mu\Delta\boldsymbol{u} + (\boldsymbol{u}\cdot\nabla)\boldsymbol{u} + \alpha\boldsymbol{u} + \beta|\boldsymbol{u}|^{r-1}\boldsymbol{u} + \nabla p\right]\mathrm{d}t = \sqrt{\mathrm{Q}}\mathrm{W},\ \nabla\cdot\boldsymbol{u} = 0,$$

where $\mu, \alpha, \beta > 0$, $r \in \{1, 2, 3\}$, Q is a non-negative operator of trace class, W is a cylindrical Wiener process in a Hilbert space $\mathbb{H}$. Under the assumption that the viscosity μ is large compared with the norm of Q, our primary goal is to solve the corresponding Kolmogorov equation in the space$\mathbb{L}^2(\mathbb{H};\eta)$, where η is the unique invariant measure associated with 2D SCBF equations. Then, we prove the well-known "carré du champs" identity. Some sharp estimates on the derivatives of the solution constitute the key component of the proofs. We take into consideration two control problems from the application side. The first is an infinite horizon control problem for which we establish the existence of solution for the Hamilton-Jacobi equation associated with it. Lastly, we demonstrate the existence of a unique solution for an obstacle problem related to the Kolmogorov operator corresponding to the stopping-time problem for 2D SCBF equations using m-accretive theory.

Purba Banerjee: June 3, 2024 (4:35 - 5:05 pm IST)

Title: Robust Pricing of Options using Martingale Optimal Transport

Abstract: In this talk, we discuss some of the recent computational methods in (Guo 2019) and (Eckstein 2021) for solving the martingale optimal transport (MOT) problem. We prove that a general, multi-step, multi-dimensional MOT problem can be approximated through a sequence of linear programming (LP) problems, which result from a discretization of the associated marginal distributions along with a suitable relaxation of the martingale condition.

Arvind Kumar Nath: June 4, 2024 (4:00 - 4:30 pm IST)

Title: Invariant Measure for Linear Stochastic PDEs in the space of Tempered distributions

Abstract: In this talk, we first explore exponential stability by using Monotonicity inequality and use this information to obtain the existence of Invariant measure for linear Stochastic PDEs with potential in the space of tempered distributions. The uniqueness of Invariant Measure follows from Monotonicity inequality.

Ashish: June 5, 2024 (4:00 - 4:30 pm IST)

Title: Ill-posedness of the Stochastic Density-dependent Incompressible Euler Equations driven by Stratonovich and Fractional Noises

Abstract: This work is concerned with the non-uniqueness of the stochastic density-dependent incompressible Euler equations defined on the whole space. We consider a linear multiplicative noise of the Stratonovich type as well as a fractional Brownian motion. We use the famous convex integration techniques developed by De Lellis and Szekelyhidi, to produce infinitely many weak solutions to the above-mentioned system in any dimension greater than or equal to two.