Possible Project 1

This project topic is designed to explore the geometric convergence of the upwind schemes in 1d for the Vlasov-Fokker-Planck system in 1D.

- Make a survey of my recent preprint: "Large time behaviors of upwind schemes by jump processes".

- Design a numerical scheme for the Vlasov-Fokker-Planck system in 1D without boundary and give a jump process interpretation.

- Read the paper "On global existence and trend to the equilibrium for the VlasovPoissonFokkerPlanck system with exterior confining potential" and make a study notes. (In our case, we do not consider the electric field. In other words, we set $\epsilon_0 = 0$)

- Explore whether we can prove the geometric convergence using the jump process way by establishing some numerical hypocoercivity property.