CONVERGENCE RATE OF STABLE LAW: STEIN'S METHOD APPROACH

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Abstract: Stein's method was first put forward by Charles Chen in 1970s to prove Berry-Esseen bound of central limit theorem, and later extended by Louis Chen to study Poisson approximation. In the past 50 years, the convergence rate of stable law was studied from time to time by many probabilists, but all their approaches were from characteristic function.

We shall apply Stein's method to prove a general inequality about stable law of i.i.d. heavy tailed random sequence, from which one can derive a convergence rate $n^{-\frac{2-\alpha}{\alpha}}$ with $\alpha > 1$. This rate seems better than the known results in literatures, we conjecture that the optimal convergence rate of stable law is $n^{-\frac{2-\alpha}{\alpha}}$ rather than $n^{-1/\alpha}$. The main ingredient of our analysis is to study Kolmogorov backward equation of OU stable process and use basic heat kernel estimates of stable processes.