

Description for the general public

Reflected Lévy processes are under interest in many aspects of applied probability. They are in use as models in queueing theory, ruin theory or biology. The process reflected at its supremum/infimum is called the draw-down/drawup process.

The main interest here concerns the first passage time for the reflected Lévy processes. This is motivated by strong need to analyze new actuarial and financial products. The aim of the project is to develop identities concerning exiting of drawdown and drawup processes from an interval and a half line. These results can be applied in solving some appearing optimization problems in finance. Within this project, we will use the fluctuation theory of Lévy process, martingale techniques and optimization theory. We are going to create new schemes and tools allowing to analyze the value functions based on drawdown and drawup.

Our results can be applied in pricing financial and insurance contracts based on reflected processes. We also consider the optimal stopping problems for these contracts. Additionally, in this project we analyze the American drawdown cap options.