Abstract

The thesis focuses on exploring the issues of asymptotic ruin probabilities in the models of self-similar Gaussian processes. Particular attention is paid to Brownian motion and fractional Brownian motion. To illustrate and better undestand the problems simulations for two-dimensional ruin are presented in the thesis.

The first part of the thesis discusses issues related to the two-dimensional simultaneous ruin for Brownian motion with drifts growing together with the initial capital. In this chapter, various relations between the rate of growth of the drift and the rate of growth of the initial capital are considered. By far the most interesting case is the case when the growth rates are equal, but also in this case exact asymptotics are presented.

The next part of the thesis focuses on one-dimensional fractional Brownian motion with random audits. This thesis presents a different perspective on the ruin of subordinate processes with limited time. In this section, exact asymptotics are presented in the general case, as well as in the specific case of the Poisson process.

The rest of the paper discusses extensions of the author's previous work in the context of non-simultaneous ruin, where the focus is put on multidimensional Brownian motion with correlated components. In this model, the time of ruin occurrence is measured for each component separately. The results presented in this section include both exact asymptotics (for the multidimensional model with positively correlated components) and logarithmic asymptotics (for the Paris ruin model with a significant time spent above the barrier).

For the two-dimensional non-simultaneous ruin model, the shapes of the generalized variance function are presented, as well as the most probable ruin paths showing exemplary behavior of processes conditioned by the breakthrough of the appropriate barriers by each of the components. Simulations allow for a broader view of the problem and also allow for examining the speed of convergence of the ruin probability to the asymptotics.