

Abstract

SCALING LIMIT OF COLLIDING BROWNIAN MOTIONS

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In this thesis we are investigating the one-dimensional colliding Brownian motions. In the first chapters we go through the important theorems and definitions of stochastic analysis and stochastic differential equations.

In the next chapters we are concentrating on the colliding Brownian motions. For describing the collision between two particles we will use the generalized Skorokhod reflection. This method shows us the new position of the particles after they hit each other regarding their speed (variance) and mass (collision parameter). Our main goal is to show that the limit process (when the variance of the lower one goes to infinity and its "mass" goes to zero) is a Bessel process with a dimension parameter which will be estimated. To do this we will see some simulations - written in Python and Mathematica - and make statistics about them. We will find the distribution of the position of the lower process between the wall and the upper process and the distribution of the upper process. We will also show a previous result about three colliding Brownian motion, although in a different setup.