FINE STRUCTURE OF THE COMPLEX HYPERBOLIC BROWNIAN MOTION AND RUDIN'S QUESTION

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Abstract: We investigate the fine structure of the complex hyperbolic Brownian motion in the unit ball of $\mathbb{C}^n$. It turns out that the generator of the process is locally very close to the generator of some simple transformation of the classical Brownian motion. This fact helps us to give an intuitive explanation why the invariant Laplace operator in the unit ball of $\mathbb{C}^n$ is a difference of two ordinary Laplace operators – the question set by W. Rudin in his monograph *Function Theory in the Unit Ball of $\mathbb{C}^n$*.

In the second part of the paper we find stochastic differential equations for the complex hyperbolic Brownian motion on the ball model of the complex hyperbolic space and furnish in this way an important tool in a further investigation of this process.

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