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Regular version of holomorphic Wiener function

By

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1. Introduction

In the previous paper [8], we suggested a definition of the skeletons of holomorphic Wiener functions as follows: Let (B, H, μ, J) be an almost complex abstract Wiener space. For an L^p-holomorphic Wiener function F, we defined the skeleton of F by

$$F(h) := \int_B F(z+h)\mu(dz), \qquad h \in H.$$

Also we suggested a definition of the contraction operation,

$$F(\sqrt{t}\, z) := T_{-\log t}F(z), \qquad 0 < t \leq 1,$$

Where $\{T_t\}_{t\geq 0}$ is the Ornstein-Uhlenbeck semigroup. Then we gave several reasons why these notions should be defined as above.

However we have to say that our reasoning was somewhat weak, because we did not describe exactly for what elements of B, holomorphic Wiener functions are well-defined. For example, in the theory of Dirichlet spaces, each function of finite energy has a nice version, so-called the quasi-continuous version, which is uniquely defined up to the sets of capacity 0. By this version, we could establish a calculus beyond "*almost everywhere*". In fact, to study the skeletons and the contraction operation, we need a calculus beyond almost everywhere.

"Without capacity, can we carry out a calculus beyond almost everywhere?" This is a question that was raised by K. Itô, when he tried to reconstruct the Malliavin calculus without topology ([5]). Note that without topology, we cannot define a capacity. Eventually, he could solve the question, establishing a new class of exceptional sets(, which he called *strictly null sets*), and accordingly, nice versions of Malliavin's smooth functions(, which he called *regular versions*).

In this paper, we exactly develop K. Itô's idea in our context. Namely, we define a class of exceptional sets, which we shall call *holomorphically exceptional sets* and show that each holomorphic Wiener function has a nice version

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