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Fourier Ultra-Hyperfunctions Valued in a Fréchet Space

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Introduction

When the theory of Sato-hyperfunctions appeared in 1958, J. Sebastiaõ e Silva attempted to construct a space of ultra-distributions which contains the space $\mathfrak{H}'$ of tempered ultra-distributions and the space H' of all distributions of exponential growth and is stable under the Fourier transformation. He defined the space which he named the space of ultra-distributions of exponential type and obtained some important results for one-dimensional case [10].

(On the other hand, he studied the space $\mathfrak{H}'$ of tempered ultra-distributions for the one-dimensional space. Hasumi [1] extended the space for the n-dimensional space and obtained some valuable results.)

The n-dimensional case was studied by Y. S. Park and M. Morimoto [11]. We defined the space $Q(\boldsymbol{C}^n)$ which was included and dense in the spaces $H(\boldsymbol{R}^n)$ and $\mathfrak{H}(\boldsymbol{C}^n)$ and stable under the Fourier transformation. The dual space $Q'(\boldsymbol{C}^n)$ of $Q(\boldsymbol{C}^n)$ includes the spaces $H'(\boldsymbol{R}^n)$ and $\mathfrak{H}'(\boldsymbol{C}^n)$. The elements of the dual space $Q'(\boldsymbol{C}^n)$ are called the Fourier ultra-hyperfunctions in the Euclidean n-space.

The extension of the theory of Fourier hyperfunctions in T. Kawai [5] to vector valued case was studied by Y. Ito [2], Y. Ito and S. Nagamachi [3], [4], and other mathematicians.

In this paper, we establish the theory of Fourier ultra-hyperfunctions valued in a Fréchet space.

Our results are roughly as follows. Let $Q_b(T^n(K); K')$ be the space of all continuous functions f on $\boldsymbol{R}^n+iK$ which are holomorphic in the interior of $\boldsymbol{R}^n+iK$ and satisfy the estimate:

$$\sup\{\exp(\langle x, \eta\rangle)|f(z)|;\ \eta\in K',\ z\in \boldsymbol{R}^n+iK\}<\infty\ ,$$

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