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Fundamental Properties of Modified Fourier Hyperfunctions

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Introduction

In the present paper we discuss the fundamental properties of modified Fourier hyperfunctions.

It is about a quarter of a century ago that Professor Sato introduced and developed the theory of hyperfunctions in [42], [43] and [44]. In [42], among many important discussions, he introduced Fourier hyperfunctions to define the Fourier transformation of hyperfunctions in the case of one variable. Roughly speaking, a Fourier hyperfunction is presented as a difference of boundary values of holomorphic functions with infra-exponential growth from a complex domain to a real domain. (These holomorphic functions which present a Fourier hyperfunction are called the defining functions of the Fourier hyperfunction.) Indicated by Sato [42], Kawai [16], [17] treated the theory of Fourier hyperfunctions of several variables. Kawai [16], [17] also discussed its applications to linear partial differential equations with constant coefficients. Modified Fourier hyperfunctions were proposed by Professors Sato and Kawai for the purpose of their applications to the so called division problem in the theory of linear partial differential equations. Kawai [17] referred the matter, and announced the publishment of the paper on the theory of modified Fourier hyperfunctions. (See pp-468, 469 in Kawai [17].) But it has not been published.

On the other hand, the theory of vector valued Fourier hyperfunctions was developed by Ito-Nagamachi [10], Nagamachi-Mugibayashi [31] and Junker [11], [12]. Nagamachi-Mugibayashi [31] also introduced (axiomatic) hyperfunction fields. Further, Nagamachi-Mugibayashi [32], [33] introduced (vector valued) Fourier hyperfunctions of the second type and mixed type to show the equivalence of the relativistic and Euclidean field theory. Afterward, Nagamachi [29], [30] treated the theory of (vector

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