16. *The Causality Condition in Nowhere Dense Perfect Model*

By Hideo YAMAGATA

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§1. **Introduction.** From the research about the source (satisfying the causality condition) which is effective to cut-off, nowhere dense perfect model (or A-integral model) was found in [4]. But even if this model be used, it seems that the usual causality condition is not necessarily satisfied. In §2 the causality condition rewritten to the mathematical form by using a sort of modeling is investigated, and the milder causality condition (found from this modeling) which is satisfied by the nowhere dense perfect set is looked for. Furthermore the fitness of this causality condition for the various examples is investigated. Next the fitness of this condition for two and three dimensional nowhere dense perfect model is also investigated. The coincidence between this model of causality condition and the usual causality condition is not necessarily obvious. But it will be sure that there is some relation between them, and it seems valuable that Dini's derivative corresponding to the finite difference for non-local field theory can be obtained in fully exact form.

In §3 A-integral representation of distribution whose carrier satisfies the above mild causality condition is constructed. Furthermore it is stated that the sequence of A-integral representations whose carrier satisfies the global causality condition can be also constructed. In §4 the various criterions of this research are shown.

§2. **The discriptions of causality condition by using a sort of modeling form.**

Consider the two dimensional Euclid space with coordinate (t,x), and one dimensional set E defined on the x axis. Next, construct the following function $t=f(x)=\int_0^x \varphi(x)\,dx$ by using the function $\varphi(x)=\begin{cases} 1/c & \text{for } x\in E^c \text{ (the complement set of } E) \\ 0 & \text{for } x\in E, \end{cases}$

where c is a constant corresponding to the light velocity. This function $t=f(x)$ can be rewritten to the form $x=f^{-1}(t)$ (not necessarily one valued with respect to t).

Definition 1. If $0<(x_1-x_2)/(f(x_1)-f(x_2))\leqq c$ holds good for any pair (x_1, x_2) with the property $x_1\neq x_2$, this set E is called