Parallel Displacements in abstract Space.

By

Kakutarô MORINAGA.

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§ 1. Introduction.

Vector analysis hitherto studied seems to have been limited to those in the n-dimensional space or a functional space only, as far as I know. Here, going beyond such limitation, we intend to investigate the vector analysis in general topological spaces, including as special case all the vector-analysis hitherto considered. Namely, the space is composed of topological base space and vector space. As the first step, in this paper we shall put the definition for the vectors in our space by means of the transformations of the elements of the base space and thus attempt to investigate the general vector analysis.

§ 2. Notations used.

$\mathfrak{M}$ .... base space,
$\mathfrak{f}, \mathfrak{g}$, ... the elements of $\mathfrak{M}$,
$\mathfrak{K}, \mathfrak{L}$ ..... a vector space,
$\mathfrak{K}_P, \mathfrak{K}_Q$ ... vector spaces induced by operators $P, Q, \ldots$. respectively,
$V, W, \ldots$. elements of $\mathfrak{K}_Q$,
$v, w, \ldots$.. elements of $\mathfrak{K}_P$,
$a, b,$ ..... numbers,
operator: $H, P, Q, \ldots$. the correspondence between the elements of two different spaces,
Operator H belongs to a set $\mathfrak{H}$,
transformation: $T_1, T_2 \ldots$. the correspondences between the elements of the base space and belong to a group $\mathfrak{G}$,
transformation: $T'_{P,\mathfrak{f}} \ldots \bar{T}_{P,\mathfrak{f}} \ldots$. the correspondences between the elements in the same vector spaces,
$\mathfrak{A}$........ the totality of functions $f(t)$,
$\mathfrak{A}'$....... the totality of functions $\bar{f}(t)$,
$g(E)$ ..... the totality of images of $g(t)$ in $\mathfrak{M}$.