

宇田雄一「古典物理学」

V_{12} の定義:

$\forall A_1 \in N_{01}(N_{01}); \forall A_3 \in \mathbb{R}_+(\mathbb{R}_+); \forall A_4 \in \mathbb{R}(\mathbb{R}); \forall n \in \mathbb{N}; \forall p \in P_n;$

$V_{12}(A_1, A_3, A_4, p) \in F_{12}(F_{12})$ and 【1】 and 【2】 and 【3】

【1】 $[V_{12}(A_1, A_3, A_4, p)](0) = 0$

【2】 $\forall m \in \mathbb{N}; \forall f \in F_{12, m}; m \neq n \Rightarrow$

$$[V_{12}(A_1, A_3, A_4, p)](f) = [V_{12}(A_1, A_3, A_4, 1 \in P_m)](f)$$

【3】 $\forall f \in F_{12, n}; [V_{12}(A_1, A_3, A_4, p)](f) \in F_{12, n}$ and 【3a】 and 【3b】

【3a】 $[[V_{12}(A_1, A_3, A_4, p)](f)](N_{2, n}) = [V_{2, n}(A_1, p)](f(N_{2, n}))$

【3b】 $\forall i \in \mathbb{Z}; \forall k \in \{1, \dots, n\};$

$$[[V_{12}(A_1, A_3, A_4, p)](f)](i, p(k)) = A_{i+2}(f(i, k))$$

V_{14} の定義:

$\forall A_1 \in N_{01}(N_{01}); \forall A_2 \in F_3(F_3); \forall A_3 \in \mathbb{R}_+(\mathbb{R}_+); \forall A_4 \in \mathbb{R}(\mathbb{R});$

$\forall n \in \mathbb{N}; \forall p \in P_n; V_{14}(A_1, A_2, A_3, A_4, p) \in F_{14}(F_{14})$ and 【1】 and 【2】

【1】 $\forall f \in F_3; [V_{14}(A_1, A_2, A_3, A_4, p)](f) = [V_3(A_1, A_2)](f)$

【2】 $\forall m \in \mathbb{N}; \forall f \in F_{14, m}; [V_{14}(A_1, A_2, A_3, A_4, p)](f) \in F_{14, m}$ and

$$[[V_{14}(A_1, A_2, A_3, A_4, p)](f)](N_{12, m}) = [V_{12}(A_1, A_3, A_4, p)](f(N_{12, m}))$$

$$\text{and } [[V_{14}(A_1, A_2, A_3, A_4, p)](f)](N_3) = [V_3(A_1, A_2)](f(N_3))$$

V_{01} の定義: $\forall A_1 \in N_{01}(N_{01}); V_{01}(A_1) \in F_{01}(F_{01})$ and

$$\forall f \in F_{01}; \forall \xi \in N_{01}; [[V_{01}(A_1)](f)](A_1(\xi)) = f(\xi)$$

$V_{02, n}$ の定義: $\forall A_1 \in N_{01}(N_{01}); \forall n \in \mathbb{N}; \forall p \in P_n;$

$V_{02, n}(A_1, p) \in F_{02, n}(F_{02, n})$ and $\forall f \in F_{02, n}; \forall k \in \{1, \dots, n\};$

$$[[V_{02, n}(A_1, p)](f)](\square, p(k), 3) = [V_{01}(A_1)](f(\square, k, 3))$$

$V_{04, n}$ の定義: $\forall A_1 \in N_{01}(N_{01}); \forall A_2 \in F_3(F_3); \forall n \in \mathbb{N}; \forall p \in P_n;$

$V_{04, n}(A_1, A_2, p) \in F_{04, n}(F_{04, n})$ and $\forall f \in F_{04, n};$ 【1】 and 【2】

【1】 $[[V_{04, n}(A_1, A_2, p)](f)](N_{02, n}) = [V_{02, n}(A_1, p)](f(N_{02, n}))$

【2】 $[[V_{04, n}(A_1, A_2, p)](f)](N_3) = [V_3(A_1, A_2)](f(N_3))$

V_{22} の定義: $\forall A_1 \in N_{01}(N_{01}); \forall A_3 \in \mathbb{R}_+(\mathbb{R}_+); \forall A_4 \in \mathbb{R}(\mathbb{R});$

$V_{22}(A_1, A_3, A_4) \in F_{22}(F_{22})$ and $\forall f \in F_{22}; \forall (\xi, i, 3) \in N_{22};$

$$[[V_{22}(A_1, A_3, A_4)](f)](A_1(\xi), i, 3) = A_{i+2}(f(\xi, i, 3))$$