FINITE DIMENSIONAL APPROXIMATIONS TO SOME FLOWS ON THE PROJECTIVE LIMIT SPACE OF SPHERES II

HISAO NOMOTO

Dedicated to Professor K. NOSHIRO on his sixtieth birthday

§ 1. **Introduction.** In the previous paper [6], we have considered flows on the measure space $(\Omega, \mathscr{B}, P)$, which was the projective limit of a certain subspace $(\Omega_n, \mathscr{B}_n, P_n)$ of the measure space $(S_n, \mathscr{B}(S_n), P_n)$, where S_n is the $(n-1)$-sphere with radius $\sqrt{n}$ and P_n is the uniform probability distribution over S_n. In particular, we have discussed how to construct a *canonical flow* $\{T_t\}$ by a consistent system of flows $\{T_t^{(n)}\}_{n=2,4,\ldots}$, where each $\{T_t^{(n)}\}$ is derived from a one-parameter subgroup of rotations of the sphere S_n. In [6, Theorem 2.2 and Proposition 2.2], we have proved that every canonical flow $\{T_t\}$ is characterized by the sequence $\Lambda = \{\lambda_1, \lambda_2, \ldots\}$ which is obtained by eigenvalues of finite dimensional rotations $T_t^{(n)}$ by which the flow $\{T_t\}$ is formed. Also, in [6], we have pointed out that the sequence Λ, called *the spectral set* of $\{T_t\}$, is a part of the spectrum of the flow $\{T_t\}$. The purpose of this paper is to determine not only the spectral type but also the ergodic property of canonical flows.

In Section 2, it will turn out that any canonical flow has a discrete spectrum which forms a subgroup of the additive group of real numbers which is generated by its spectral set. In Sections 3 and 4, we shall consider the decomposition of a canonical flow into its ergodic parts. Although the ergodic parts of the basic spaces, in general, are determined depending on the flows under consideration, we can, in our case, find the universal decomposition ζ of the basic space Ω such that

(i) *ζ is the invariant partion for any canonical flow $\{T_t\}$,*

(ii) *if $\{T_t\}$ has linearly independent spectral set, then ζ gives the decomposition of $\{T_t\}$ into its ergodic components every one of which is isomorphic to the flow on*

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