I. Kubo
Nagoya Math. J.
Vol. 35 (1969), 1–30

QUASI-FLOWS*

IZUMI KUBO

The purpose of this paper is to investigate a quasi-flow which is a one-parameter group of non-singular measurable point transformations on a measure space. If, in particular, the transformations are all measure preserving (i.e. a flow is given), the ergodicity together with the mixing property, the spectral or metrical type, increasing partitions of the space and the entropy of the flow are our main interests. Those methods used in the study of a flow are frequently useful for our approach. For example, the concept of a special flow introduced by W. Ambrose [3] plays an important role and the representation of a given flow in terms of a special flow is a powerful tool in the study of flows. L.M. Abramov [1] calculates the entropy of a flow with the help of the representation. As another example we give attention to the work of G. Maruyama [10] and H. Totoki [15] where they discuss a general time-change of flows the basic idea of which was originated by E. Hopf [8]. They discuss the invariant measure of a general time-changed flow and prove that the ergodicity is inherited and the entropy is kept invariant by the time-change. In the study of quasi-flows, we shall use both the repesentation in terms of a special quasi-flow and a time-change. Besides a quasi-flow requires its own methods in the investigation and it gives us some further problems such as the existence of an invariant measure (c.f. [4], [5], [6] and [7]) and related topics.

We are much interested in a study of two flows (quasi-flows) which are linked by a particular kind of commutation relation. Ya. G. Sinai ([13], [14]) has introduced the concept of transversal fields of a flow on a Riemannian manifold and he has obtained the results on the ergodicity of the flow. As one of generalizations, he has dealt with an admissible continuous one-parameter group of non-singular point transformations which is a transversal

Received July 15, 1968

* The results in this paper were presented at the Meeting of Mathematical Society of Japan on October 10, 1967.