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ON RAISING FLOWS AND MAPPINGS

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Communicated by E. E. Moise, October 18, 1962

It is assumed that all spaces with which we are concerned are separable metric. Let (G, X) be a transformation group with $G=I, R$ where I is the additive group of integers and R the reals. (I, X) is called a *discrete flow* and (R, X) a *continuous flow*. The *orbit* O_x of a point $x \in X$ under a flow (G, X) is the set of all gx for $g \in G$. A flow (G, Y) is *imbedded* in a flow (G, Y') if $Y \subset Y'$ and (G, Y) is (G, Y') cut down to Y. We say that (G, X) is *raised* to (G, Y) provided there is a mapping ϕ of Y onto X such that for each $y \in Y$ and $g \in G$, $\phi g(y) = g\phi(y)$. In this paper we establish that any discrete flow can be raised to a discrete flow on a zero-dimensional space and any continuous flow to a continuous flow on a 1-dimensional space. We shall note that these newly produced flows can be considered as imbedded in a discrete flow on the disc on the one hand and in a continuous flow on the solid torus in Euclidean 3-space on the other. Thus all continuous flows on compact metric spaces can be produced from continuous flows on the solid torus. We include some remarks about minimal flows in §3.

1. **Discrete flows.** Any homeomorphism g of X onto X generates a discrete flow on X and in turn any discrete flow is generated by the unit of the group G. Let g_x denote the unit of the group or the generating homeomorphism.

We wish to establish

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