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Measure-preserving homeomorphisms of noncompact manifolds and mass flow toward ends

In this talk we discuss topological properties of groups of measure-preserving homeomorphisms of noncompact manifolds (with the compact-open topology). Suppose M is a connected n-manifold and μ is a good Radon measure on M. In the case that M is compact, A. Fathi showed that

	$\mathcal{H}(M;\mu)$	$\subset$	$\mathcal{H}(M,\mu\text{-reg})$	$\subset$	$\mathcal{H}(M)$
$n \geq 3$		SDR		weak HD	
$n = 1, 2$	(ℓ_2-mfd)	SDR		HD	

We are concerned with extension of these results to the noncompact case. Suppose M is noncompact. R. Berlanga showed that $\mathcal{H}(M;\mu) \subset \mathcal{H}(M,\mu\text{-end-reg})$: SDR and in [1] we have shown that

Theorem

		(SDR)		*HD*	
$n = 2$	$\mathcal{H}(M;\mu)_0$	$\subset$	$\mathcal{H}(M,\mu\textit{-end-reg})_0$	$\subset$	$\mathcal{H}(M)_0$
	ℓ_2*-mfd*		*ANR*		(ℓ_2*-mfd)*

Our next goal is to study a relation between the group $\mathcal{H}(M;\mu)$ and the subgroup $\mathcal{H}^c(M;\mu)$ of μ-preserving homeomorphisms of M with compact support. For this purpose we introduce a sort of mass flow homomorphism. Let $\mathcal{B}_c(M)$ denote the set of Borel subsets of M with compact frontier. The mass flow toward ends induced by $h \in \mathcal{H}(M,\mu)_0$ is measured by the function

$$J_h^\mu : \mathcal{B}_c(M) \longrightarrow \mathbb{R} : J_h^\mu(C) = \mu(C - h(C)) - \mu(h(C) - C).$$

These functions J_h^μ form a topological vector space V_μ and we obtain a continuous group homomorphism $J^\mu : \mathcal{H}(M;\mu)_0 \to V_\mu$. In [2] we have shown

Theorem (1) *J^μ has a continuous (non-homomorphic) section.*
(2) $\mathcal{H}(M;\mu)_0 \cong \operatorname{Ker} J^\mu \times V_\mu$ $\quad$ $\operatorname{Ker} J^\mu \subset \mathcal{H}_E(M;\mu)$ *: SDR*

The study of relation $\mathcal{H}^c(M;\mu)_0 \subset \operatorname{Ker} J^\mu$ is in progress.

References

[1] T. Yagasaki. Groups of measure-preserving homeomorphisms of noncompact 2-manifolds, *Topology and its Appli.*, 154 (2007) 1521–1531.

[2] T. Yagasaki. Measure-preserving homeomorphisms of noncompact manifolds and mass flow toward ends, arXiv math.GT/0512231.

[3] T. Yagasaki. Groups of volume-preserving diffeomorphisms of noncompact manifolds and mass flow toward ends (preprint)