



Homomorphisms between diffeomorphism groups

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For r at least 3, p at least 2, we classify all actions of the groups $\text{Diff}^r_c(\mathbb{R})$ and $\text{Diff}^r_+(S^1)$ by C^p -diffeomorphisms on the line and on the circle. This is the same as describing all nontrivial group homomorphisms between groups of compactly supported diffeomorphisms on 1-manifolds. We show that all such actions have an elementary form, which we call topologically diagonal. As an application, we answer a question of Ghys in the 1-manifold case: if M is any closed manifold, and $\text{Diff}(M)_0$ injects into the diffeomorphism group of a 1-manifold, must M be 1 dimensional? We show that the answer is yes, even under more general conditions. Several lemmas on subgroups of diffeomorphism groups are of independent interest, including results on commuting subgroups and flows.

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