Graz University of Technology

Institut für Geometrie

Vortrag

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Commutators of Diffeomorphisms

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Suppose M is a smooth manifold and let G denote the connected component of the identity in the group of all compactly supported diffeomorphisms of M. It has been known for quite some time that the group G is simple, i.e. has no non-trivial normal subgroups. Consequently, G is a perfect group, i.e. each $g \in G$ can be written as a product of commutators,

$$g = [h_1, k_1] \circ \cdots \circ [h_N, k_N], \qquad h_i, k_i \in G.$$

Actually, all available proofs (Herman, Mather, Epstein, Thurston) for the simplicity of G first establish perfectness; it is then rather easy to conclude that G has to be simple. The perfectness of G is of interest in differential topology too, as it is related to the connectivity of Haefliger's classifying space for foliations.

In the talk I will discuss a new, more elementary, proof for the perfectness of G. This approach also shows that the factors h_i and k_i in the presentation above can be chosen to depend smoothly on g. Moreover, it leads to new estimates for the number of commutators necessary. If g is sufficiently close to the identity, then $N = 4$ commutators are sufficient; for certain manifolds M, even $N = 3$ will do.

This talk is based on joint work with T. Rybicki and J. Teichmann.

J. Wallner