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Recent Progress in the Span of Smooth Manifolds

The span of a smooth manifold M is a classical invariant, defined as the maximal number of (pointwise) linearly independent tangent vector fields on M. We shall also consider the related concepts of stable span and immersion codimension. Some recent progress (with D. Crowley) showing that these invariants can depend on the smoothness structure of M will be described, as well as some recent progress (with J. Korbaš and P. Sankaran) related to the span of a specific family of manifolds, the projective Stiefel manifolds $X_{n,r}$.

In the former case we shall give examples of manifolds in dimension 15 and higher where the span, stable span, and immersion codimension can be different for different smoothness structures. In the latter case we shall show how various techniques can be applied, in particular the ring structure in (complex) K-theory, to obtain refined estimates of the span of $X_{n,r}$.