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Function spaces that are Hilbert manifolds

In this talk we discuss whether function spaces (i.e., spaces of continous maps from a space to another) are (topological) Hilbert manifolds, both in case of uniform topology and compact-open topology. In light of Torunczyk's characterization of Hilbert manifolds, in the discussion of this problem it is crucial to know whether or not the function space is an ANR.

In case of uniform topology, the notion of ANRU, a uniform version of ANR (introduced by Isbell [1] and slightly modified by Nguyen To Nhu [2]), plays a key role and we are largely successful to show the function space is a Hilbert manifold if the range space is an ANRU.

In case of compact-open topology, the noncompactness and homological property of the domain space and its relation to the range space affect the function space and makes it an interesting problem to determine if the space is an ANR.

The last part of this work is closely related to the recent works of Smrekar [3, 4] from the homotopical viewpoint.

References

[1] J. R. Isbell. Uniform neighborhood retracts, *Pacific J. Math.* 11 (1961), 609–648.

[2] Nguyen To Nhu. The gluing theorem for uniform neighborhood retracts, *Bull. Acad. Polon. Sci. Ser. Sci. Math.* 27 (1979), 189–194.

[3] J. Smrekar. Compact open topology and CW homotopy type, *Top. Appl.* 130 (2003) 291–304.

[4] J. Smrekar. CW homotopy type of inverse limits and function spaces, *preprint*.