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An elementary proof of the reconstruction theorem

The reconstruction theorem, a cornerstone of Martin Hairer's theory of regularity structures, appears in this article as the unique extension of the explicitly given reconstruction operator on the set of smooth models due its inherent Lipschitz properties. This new proof is a direct consequence of constructions of mollification procedures on spaces of models and modelled distributions: more precisely, for an abstract model Z of a given regularity structure, a mollified model is constructed, and additionally, any modelled distribution f can be approximated by elements of a universal subspace of modelled distribution spaces. These considerations yield in particular a non-standard approximation results for rough path theory. All results are formulated in a generic (p, q) Besov setting. There are also implications on learning solution maps from a machine learning perspective.

Joint work with Harprit SINGH

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