

Algebraic examples of differential categories

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Differential categories were introduced by Blute, Cockett and Seely in part as a categorical axiomatization of the differential lambda-calculus of Ehrhard and Regnier. The key idea is that one has a monoidal category with a comonad; one thinks of the base category as the linear maps and the co-Kleisli category as the differential maps. A differential category then has a differential combinator satisfying abstract analogues of the usual differentiation axioms.

In this talk, we consider other algebraic approaches to differentiation. We consider Ritt's notion of differential algebra, and show that every differential algebra generates a differential category, enriched over the base field. We also establish connections to homological algebra using the bar resolution as an endofunctor on the category of chain complexes.

*Joint work with Robin Cockett, Kim Flak, and Robert Seely.