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*Enriched Morita equivalence for  $S$ -sorted theories*

The theory of Morita equivalence characterises those pairs of algebraic theories that yield equivalent categories of algebras. The notion of a theory and of its algebras can be varied and many similar results arise: taking *rings* as theories and *modules* over a given ring as algebras, we get the original result of Morita [1]. The non-additive version (by Knauer and Banaschewski [2,3]) takes *monoids* as theories and *monoid actions* as algebras. Morita equivalent *Lawvere theories* were characterised by Dukarm [4]. For *many-sorted* algebraic theories, Adámek, Sobral and Sousa [5] proved a generalisation of Dukarm's result.

All these results are stated using the notion of a *pseudoinvertible idempotent*: two theories  $\mathcal{T}'$  and  $\mathcal{T}$  over the same set of sorts are Morita equivalent iff  $\mathcal{T}'$  is an idempotent modification of  $\mathcal{T}$ , given some choice of pseudoinvertible idempotents in  $\mathcal{T}$ .

This gives a hint that it should be possible to state a more general result subsuming all the aforementioned results. We show that this is in fact true and we give a characterisation of  $S$ -sorted Morita equivalent theories (parametric in the choice of the notion of a theory) that works for ordinary categories as well as for enriched categories. We show some examples that abound naturally as a consequence of the main result.

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References:

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