Morita theorems for firm categorical semigroups

Ülo Reimaa
University of Tartu
Tartu, Estonia

The Morita theory of rings can be thought of as the study of equivalences between categories of modules, or equivalently, as the study of invertible bimodules.

The the additive structure of rings is not necessary to get a nice theory of Morita equivalence. When we forget the additive structure, we get the Morita theory of monoids. Indeed, a good theory of Morita equivalence is known to exist for categorical monoids, meaning monoids on objects M of some category $\mathcal{C}$, with multiplication maps $M \otimes M \to M$, where $- \otimes -$ is a (tensor) product functor on $\mathcal{C}$. The special case of rings arises when $- \otimes -$ is the tensor product functor on the category of abelian groups.

We outline how to get a similar theory of Morita equivalence for **firm categorical semigroups**, which are categorical semigroups that can act as a unit with respect to the tensor product of bimodules. We will illustrate the results with examples from topology.