Online Algebra, Logic and Topology Seminar

(CMUC, University of Coimbra)

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Effective (co)descent morphisms in some topological categories

Abstract. We deal with the problem whether it is sufficient, when investigating the problem of the effectiveness of a descent morphism, to restrict the consideration only to the descent data (C, γ, ξ), where γ lies in a morphism class $\mathbb{E}$; the notion of a factorization system and the dual to the amalgamation property play the key role in our discussion. With the aid of the obtained results, we find conditions on a functor F preserving (not necessarily all pullbacks, but) pullbacks of morphisms from $\mathbb{E}$, under which the functor F reflects the property "all descent morphisms are effective". The following two particular cases are of special interest: (1) F is a full coreflection; (2) F is a topological functor. Applying the results obtained along this line, we show that all regular epimorphisms (= open surjective continuous homomorphims) are effective descent morphisms in the category of topological $\mathcal{V}$-algebras, where $\mathcal{V}$ is a Mal'cev variety of universal algebras. Moreover, we show that all regular monomorphisms are effective codescent morphisms in the categories of topological spaces, compact Hausdorff topological spaces, normal topological spaces, Banach spaces, and some others. Besides, it is shown that all codescent morphisms are effective in the the categories of Hausdorff topological spaces, metric spaces and complete metric spaces. For the internal characterizations of such morphisms in the latter categories, some partial results are obtained. The complete characterization of effective codescent morphisms $p : B \to E$ are given for the category of Hausdorff topological spaces, in the case of compact B and regular E.