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Quillen's model categories revisited

We refer to Quillen's notion of a category $\mathcal{C}$ furnished with a *model structure*

$$\{\mathcal{W},\ \mathcal{F},\ co\mathcal{F}\}$$

(weak equivalences, fibrations, cofibrations), and the construction of the localization of the class $\mathcal{W}$ as the quotient by the congruence determined by homotopies in the sets $\mathcal{C}(X, Y)$ of morphisms of $\mathcal{C}$ [*Homotopical Algebra*, Springer LNM 43]. In joint (unpublished) work with Martin Szyld and Emilia Descotte we have developed a 2-dimensional generalization of this notion and construction.

In this talk I will consider the 2-dimensional theory in the particular case in which the model bicategory is the trivial model bicategory determined by a model category. In this case the computations are considerable simpler, and our theory yields new results in the ordinary theory of localization of categories.

The novel feature is the introduction of a generalization of cylinder object which allows the construction of the homotopy congruence associated to an arbitrary single class Σ, and its quotient homotopy category $\mathcal{H}o(\mathcal{C}, \Sigma)$. There is a functor $\mathcal{H}o(\mathcal{C}, \Sigma) \longrightarrow \mathcal{C}[\Sigma^{-1}]$, which is an isomorphism if Σ is *split generated* (an arrow f is split if there exists g such that $fg = id$ or $gf = id$) and satisfies the *3 for 2 property*. When Σ is the class $\mathcal{W}$ of a model category, we obtain Quillen's results.