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Stable Cohomotopy Groups of Compact Spaces

Suppose that $\mathbf{H} = \{h^n\}$ is a generalized cohomology theory defined on the homotopy category of finite pointed CW complexes. For example the stable cohomotopy groups

$$\pi_s^n(X) = \varinjlim \{\, [X, S^n] \to [\Sigma(X), S^{n+1}] \to \dots \}$$

form such a generalized cohomology theory.

The Čech cohomology groups $h^n(X)$ of a compact Hausdorff space X are equal to the direct limit of the system $\{h^n(|N(\alpha)|)\}$, where α varies over all finite open coverings of X.

There are a large number of facts showing that the stable cohomotopy theory has certain universal properties among all generalized (Čech) cohomology theories on compact spaces.

Using stable cohomotopy groups we are also able to characterize compact Hausdorff spaces *cohomologically equivalent* (i.e. isomorphic as objects of the stable shape category) to infinite-dimensional spaces, metrizable spaces or finite CW complexes.