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On the Chogoshvili's spectral homology theory of the second family

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Let LP_2 be a category of pairs of locally compacted paracompact spaces and their proper mappings, and $(X, A) \in LP_2$. Locally finite open covering $\alpha_r = \left\{ U_t^{(\alpha_r)} | t \in T^{(\alpha_r)} \right\}$ of a space X is called a regular covering, if the closures of its elements are compact in X. Let denote induced by a covering α_r a regular covering in the subspace A as $\widetilde{\alpha_r}$. Let denote as $Cov^r(X, A) = \{(\alpha_r, \widetilde{\alpha_r}) | \alpha_r \in Cov^r(X)\}$ the set of all regular coverings of the pair (X, A), and as $(N_{\alpha_r}, N_{\widetilde{\alpha_r}})$ a pair of nerves of the pair coverings $(\alpha_r, \widetilde{\alpha_r})$. Each inscription $(\alpha_r, \widetilde{\alpha_r}) \succ \left(\alpha'_r, \widetilde{\alpha'_r}\right)$ defines

$$\pi_{\alpha'_r}^{\alpha_r} : (N_{\alpha_r}, N_{\widetilde{\alpha_r}}) \to \left(N_{\alpha'_r}, N_{\widetilde{\alpha'_r}}\right) \qquad (1)$$

the pairwise adjacent simplicial mappings. Let $H_n^{\inf}(N_{\alpha_r}, N_{\widetilde{\alpha_r}}; G)$ and $H_f^n(N_{\alpha_r}, N_{\widetilde{\alpha_r}}; H)$ n-dimensional homology and cohomology groups of all arbitrary (possible) cycles and finite cocycles of pairs of complexes $(N_{\alpha_r}, N_{\widetilde{\alpha_r}})$ with coefficients from groups G and H respectively. Then these groups and the homomorphisms $\pi_{\alpha'_r *}^{\alpha_r}$ and $\pi_{\alpha'_r}^{\alpha_r *}$, induced by the mappings (1), are constitute the direct and inverse spectra respectively homological and cohomological groups and homomorphisms:

$$\left\{ H_n^{\inf}(N_{\alpha_r}, N_{\widetilde{\alpha_r}}; G), \pi_{\alpha'_r *}^{\alpha_r} | \alpha_r, \alpha'_r \in Cov^r(X) \right\}$$

and

$$\left\{ H_f^n(N_{\alpha_r}, N_{\widetilde{\alpha_r}}; H), \pi_{\alpha'_r}^{\alpha_r *} | \alpha_r, \alpha'_r \in Cov^r(X) \right\}.$$

Let denote their limiting groups as $H_n^{\inf}(X, A; G)$ and $H_f^n(X, A; H)$ and name them as n- dimensional spectral homological and cohomological Chogoshvili groups of second family of the pair $(X, A) \in LP_2$ over the groups of coefficients G and H, based on infinite chains and finite cochains, respectively.

It has been proved that $H_*^{\inf}$ is a semi-exact homology theory, while H_f^* satisfies all the Eilenberg-Steenrod axioms for cohomology theory. If $(X, A) \in LP_2$, the group G is compact and $G|H$, then the above constructed homology and cohomology groups are dual, i.e. $H_n^{\inf}(X, A; G) | H_f^n(X, A; H)$, $n \in Z$.

Rerefences

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