

MR939473 (89e:55015) 55N35**Barge, Jean (F-LILL); Ghys, Étienne (F-LILL)****Surfaces et cohomologie bornée. (French) [Surfaces and bounded cohomology]***Invent. Math.* **92** (1988), no. 3, 509–526.

For M a manifold, the bounded cohomology $H_b^*(M, \mathbf{R})$ is the cohomology of singular cochains whose value on a singular simplex is bounded independent of the simplex. From the work of Gromov, one knows that bounded cohomology interacts in a delicate manner with the group theory, topology, and geometry of M .

In this paper, the authors utilize the methods of bounded cohomology to obtain the following results. Theorem: For each k , there exists a nilpotent group Γ of finite type such that $H_2(\Gamma, X)$ is not generated by classes representable by a surface S of genus k . Theorem: For S a surface of hyperbolic type, the map (2-forms on S) $\rightarrow H_b^2(S, \mathbf{R})$ is injective.

In particular, the second theorem shows $H_b^2(S, \mathbf{R})$ to be highly infinite-dimensional.

Reviewed by *Robert Brooks*