Bounded noncommutative geometry and boundary actions of hyperbolic groups.

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Abstract

We use the canonical Lipschitz geometry available on the boundary of a hyperbolic group to construct finitely summable Fredholm modules over the crossed product of the boundary action. The procedure yields a full set of representatives of the K-homology of the crossed product, and all of them are $p$-summable for $p$ in an appropriate range related to the geometry of the boundary. By restricting these boundary Fredholm modules to the reduced group $C^*$-algebra of the group, we obtain classes in the K-homology of the (reduced) group $C^*$-algebra. This implies various results about the (reduced) representation ring, for example that every class in the representation ring of a classical hyperbolic group of dimension $n$ is represented by a $n^+$ summable Fredholm module – generalizing an observation of Connes.