Seminarium geometrów

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The reduced ℓ^p-cohomology in degree 1 and harmonic functions

Abstract: Reduced ℓ^p-cohomology in degree 1 (for short "LpR1") is a useful quasi-isometry invariant of graphs [of bounded valency] whose definition is relatively simple. On a graph, there is a natural gradient operator from functions to vertices to functions on edges defined by looking at the difference of the value on the extremities of the edge. Simply put, this cohomology is the quotient of functions with gradient in ℓ^p (of the edges) by functions who are themselves in ℓ^p (of the vertices). "LpR1" is a space of function on some ideal boundary. For example, for $p = 1$ it can be seen as a space of functions on the ends. In the case of hyperbolic graphs it can be seen as a space of Besov functions on the usual boundary (a result of Bourdon & Pajot). In this talk, I will explain how, under some assumptions on the isoperimetric profile one can identify "LpR1" with a subspace of the space of bounded harmonic functions and yields some interesting corollaries on this space (for example, on lamplighter graphs) as well as applications to the cohomology of group representations. The transport cost comes up naturally as a key ingredient in the proof.