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Ross Geoghegan* (ross@math.binghamton.edu), Department of Mathematics, Binghamton University (SUNY), Binghamton, NY 13902-6000. *Controlled acyclicity invariants of group actions on CAT(0) spaces.*

This is joint work with Robert Bieri. We have new invariants in the spirit of the Bieri-Neumann-Strebel invariant. The input is: a positive integer n , a group G of type FP_n , a $\mathbb{Z}G$ -module A , and an action ρ of G by isometries on a proper CAT(0) metric space M . The output is $\Sigma^n(\rho; A)$ which is a subset of the (compact) boundary-at-infinity of M . This subset contains subtle information about the interplay between A and the action ρ . Even the case $n = 0$ is non-trivial.

In the case where A is the trivial $\mathbb{Z}G$ -module \mathbb{Z} this reduces to a homological version of our previously published “Sigma theory” of actions of groups on proper CAT(0) spaces (Memoirs AMS, Number 765). In the case where the CAT(0) space is just the real vector space $G/G_{ab} \otimes \mathbb{R}$ this reduces to the Bieri-Renz invariant $\Sigma^n(G; A)$.

In this talk I will emphasize a new method in our theory - the use of “finite volleys” - which replaces (and is much simpler than) the “finitary sheaves of maps” in our earlier work. I believe this method will have other uses for constructions at the borderline of group theory and geometric topology. (Received January 23, 2007)