Seminarium geometrów

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Burnside vs Kazhdan

Abstract: A *free Burnside group* $B(m,n)$ is the group with presentation $\langle s_1,\dots,s_m \,|\, w^n=1\rangle$, where w runs over all words in $s_1^{\pm 1},\dots,s_m^{\pm 1}$, that is, there is a uniform bound n on orders of elements. Novikov-Adyan were the first to construct infinite groups of this type. I will show that if $B(m,n)$ is infinite then, for each $k>1$, the free Burnside group $B(m,kn)$ acts with unbounded orbits on a CAT(0) cubical complex. In particular, $B(m,kn)$ has no Kazhdan's property (T). This provides a negative answer to a question by Bekka-de la Harpe-Valette and a conjecture by Shalom. The proof uses a general technique of *group cubization* introduced by me recently.