INTRINSIC TAME FILLING FUNCTIONS

ANISAH NU'MAN

Abstract. Let G be a group with a finite presentation $\mathcal{P} = \langle A|R \rangle$ such that A is inverse- closed. Let $f : \mathbb{N}[\frac{1}{4}] \to \mathbb{N}[\frac{1}{4}]$ be a nondecreasing function. Loosely, f is an intrinsic tame filling function for $(G, \mathcal{P})$ if for every word w over A^* that represents the identity element in G, there exists a van Kampen diagram Δ for w over $\mathcal{P}$ and a continuous choice of paths from the basepoint $*$ of Δ to the boundary of Δ such that the paths are steadily moving outward as measured by f. The isodiametric function (or intrinsic diameter function) introduced by Gersten and the extrinsic diameter function introduced by Bridson and Riley are useful invariants capturing the topology of the Cayley complex. Tame filling functions are a refinement of the diameter functions introduced by Brittenham and Hermiller and are used to gain insight on how wildly maximum distances can occur in van Kampen diagrams. Brittenham and Hermiller showed that tame filling functions are a quasi-isometry invariant and that if f is an intrinsic (respectively extrinsic) tame filling function for $(G, \mathcal{P})$, then $(G, \mathcal{P})$ has an intrinsic (respectively extrinsic) diameter function equivalent to the function $n \mapsto \lceil f(n) \rceil$. In contrast to diameter functions, it is unknown if every pair $(G, \mathcal{P})$ has a finite-valued tame filling function.

In this talk I will discuss intrinsic tame filling functions for graph products (a generalization of direct and free products) and certain free products with amalgamation.