Fuchsian tessellations and applications

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This is a joint work with Judit Abardia-Evéquoz. Fuchsian tessellations in the hyperbolic plane have been considered by several authors (cf. [1], [2], [3]) to design signal constellations and nonuniform Fuchsian codes in the hyperbolic plane. They take advantage of strong relations with algebraic structures, such as quaternion algebras and quadratic forms, and hyperbolic geometry.

We review the construction of those Fuchsian tessellations and explore its centers in order to obtain a good behaviour in the applications. The study of the centers blends euclidian and hyperbolic points of view, leading to consider the minimum border distance. Some examples of explicit constructions will be given. A new approach is presented introducing bicenters and assignation based on probability of transmission.

[1] Carvalho, E.D., Andrade, A.D., Palazzo R. Jr, Vieira Filho, J., *Arithmetic Fuchsian groups and space-time block codes*, Comput. Appl. Math. 30, 485–498 (2011).

[2] Blanco, I., Remón, D., Hollanti, C., Alsina, M., *Nonuniform Fuchsian codes for noisy channels*, Journal of the Franklin Institute **351**, (2014). 5076-5098.

[3] Blanco, I.; Hollanti, C.; Alsina, M.; Remón, D., *Fuchsian codes with arbitrarily High code rates*, Journal of Pure and Applied Algebra **220** (2016), 180–196.

[4] Alsina, M.; Abardia-EvÃ©quoz, J., *On centers of hyperbolic tessellations and their applications* (in progress).