2D TESSELLATIONS OF SQUARE CHORD DIAGRAMS

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We introduce a combinatorial analysis of doubly periodic tangles considered as square chord diagrams when they tile the plane. Each tiling by a single square chord diagram, $D(m, n)$ with m and n horizontal and vertical respective endpoints generates finite closed curves or infinitely periodic open curves in the plane. We formally define curves, curve equivalence, and curve slope. We give theorems on decomposition of these chords that define connected curves. We study the size of minimal rectangles enclosing the minimal period of these curves, prove that their size is constant for closed curves, and give precise bounds for the infinite curves. The notions can be generalized to higher dimensions.

Keywords: Chord diagram, periodic curve slope, curve equivalence, chord decomposition.