

Limit-periodic tilings in 1, 2, and 3 dimensions

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A tile of a certain shape can tile 3D space, but only in a nonperiodic pattern. The proof surprisingly simple (once the tile shape is discovered), and the resulting pattern is limit-periodic. Variations on the theme produce intricate mathematical features, and related statistical mechanical models suggest that these could be realized in spontaneous processes of material formation in 2D or 3D. Substitution rules in 1D can produce limit-periodic tilings with novel scaling properties in reciprocal space. This talk will focus primarily on mathematical properties of the 2D Taylor-Socolar limit-periodic tiling and a particular 1D substitution tiling.