Rigidity of 3 Dimensional Frameworks

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Summary

We started our research by reading *Stability of Quaicrystal Frameworks in 2D and 3D* by Eliana M. Duarte Gelvez and George K. Francis in order to establish a strong foundation of knowledge about frameworks.

Important Definitions

- Framework (rod-and-pinion): A framework is a set of many rigid edges connected to the vertices of a cubical lattice. This configuration of edges and vertices can be manipulated freely. The frameworks that we have been studying have their vertices on the lattice points of integral lattices in $R^n, n = 2 and 3$.
- Deformations: A motion of a framework in any dimension is called a deformation of the framework if it preserves the lengths of all of the edges of the framework but alters the distance between some pair of vertices of the framework.
- Rigidity: Rigidity is a property of a framework in which the framework cannot be deformed.

Tony Robbin COAST.

A 3D quasicrystal, plated framework.

Rigidity of a 3 Dimensional Framework

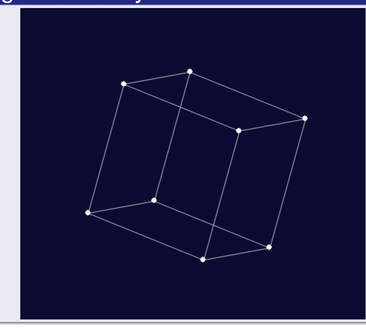
Frameworks can be defined in N-space. In Spring 2013, the IGL group on the Stability of Quasicrystal Frameworks in 2D and 3D group proved a generalization of Wester's Conjecture in 2 dimensions. Attempts to find a proof in 3 dimensions were unsuccessful. This semester, we studied 3-dimensional frameworks because 3-dimensional frameworks is the next step to study, and they have more relevance to a world with framed buildings.

Bracing with Faces

The Westergame

Using the Westergame

3D Modeling of Quasicrystals



Use of 3D Models

Future Goals

Group

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