

Rigidity of polyhedral surfaces beyond triangulations

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Abstract: The study of rigidity for triangulated spheres has a long history of famous results, such as the global and infinitesimal rigidity of convex spheres (Cauchy, Dehn), the infinitesimal rigidity of generic spheres (Gluck) and the surprising existence of flexible spheres (Connelly). In this talk we move beyond triangulations and explore the rigidity properties of general 3-dimensional polyhedra (aka. polyhedral spheres). For this we impose edge length constraints and coplanarity constraints for the faces. This means that the faces are allowed to change their shape during a flex as long as they stay flat. This setting gives rise to a plethora of open questions and conjectures, of which we give an overview. We hint at the unique challenges that come with non-triangular faces, and show that while not globally, locally or infinitesimally rigid even in the convex case, polyhedra are still infinitesimally rigid generically.