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Applying Geometric Constraints in Three Dimensions

In Computer Assisted Design (CAD), an object can be represented as a triangular mesh in three dimensions. In many cases, a problem is to enforce certain constraints on the individual triangles in the mesh. For example, in civil engineering, a designer may be concerned about drainage requirements of a grading site that is represented as a Triangulated Irregular Network (TIN). Hence, the designer may want to enforce some slope and flow direction constraints on the triangles.

In this talk, we model various engineering constraints as geometric constraints in three dimensions. We then find projection operators for these constraints, and solve the problem by iteratively applying these projectors. Besides, we also consider optimization problems in which we seek solutions that are optimal with respect to certain criteria.

(*) Joint-work with Valentin Koch (AutoDesk, Inc.)