The geometry of polyhedral surfaces

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Abstract. Classical differential geometry deals with smooth surfaces and Riemannian metrics. In contrast, a polyhedral surface, such as a tetrahedron, is a surface composed of Euclidean (or spherical, hyperbolic) triangles. This talk discusses the geometry of polyhedral surfaces. We begin by introducing the discrete curvature of polyhedral surfaces, which is an analogous to Gaussian curvature on smooth surfaces. One of the main problems on surface geometry is to understand the relationship between curvature and metric. This relationship will be discussed in detail. It turns out that the cosine law for triangles should be considered as a curvature-metric relation in this setting. We will show you how cosine law implies many rigidity phenomena about the polyhedral surface geometry. Applications to Teichmuller spaces of surfaces will be discussed.