VI. Polyhedral Combinatorics

21 Indicator functions
22 Non-convex polyhedra
23 Volume by integration

Spheres and balls naturally arise in mesh generation where they are used to express how points are distributed in a geometric space. Envelopes of spheres, and equivalently boundaries of unions of balls, are used to represent geometric shape. Molecular modeling is probably the most prominent application area of this shape representation. This chapter entertains questions related to the structure of a union of balls. Section 21 develops an indicator function for convex polyhedra using inclusion-exclusion. Section 22 generalizes the indicator function to non-convex polyhedra. Section 23 computes volume by integrating indicator functions and applies this technique to the special case of a finite union of spherical balls.