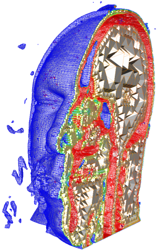
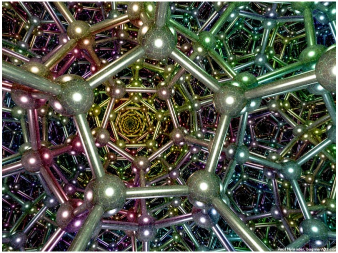
Measuring Curvature at a Vertex

Structure of Viruses | Approximations | Shape of Universe





1. Russell Knightley. `http://www.rkm.com.au/VIRUS/HIV`, 2. K. Weiss & L. De Floriani: Isodiamond Hierarchies, IEEE Transactions on Vis & Comp Graphics `http://kennyweiss.com/` 3. Paul Nylander: life from the inside

Angle defect at a vertex = $360^\circ -$ sum angles at a vertex

Polyhedron	Angle Defect	V (# Vertices)	Total Angle Defect
Dodecahedron			
flat soccer ball (truncated icosahedron)			

Why is the Total Angle Defect 720° ?

angle defect at a vertex = $2\pi -$ sum angles at a vertex

total angle defect =
$\sum_{V}$ angle defect at a vertex=

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sum of angles in 1 face =

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sum of angles in 1 face = π(# sides in face -2) = π(# sides)-2π

sum of all the angles=

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total angle defect = $2\pi V - (2\pi E - 2\pi F) = 2\pi(V - E + F)$
geometric combinatorics

Polyhedra

In the proof that there are five regular polyhedra, recall that we had n total polygonal faces and p k-sided faces touch at a vertex. Characterize E and V in terms of n, p and k.

a) $E = \frac{nk}{2}$ $V = \frac{nk}{p}$

b) $E = \frac{nk}{2}$ $V = \frac{nk}{2}$

c) $E = \frac{nk}{p}$ $V = \frac{nk}{2}$

d) $E = \frac{nk}{p}$ $V = \frac{nk}{p}$

e) other

Taxicab Geometry

In taxicab geometry, do 3 noncollinear points determine a unique taxicab circle?

a) yes and I have a good reason why

b) yes but I am unsure of why

c) no but I am unsure of why not

d) no and I have a good reason why not

e) other