DYNAMIC SPHERE GEOMETRY

The concept originated studying the geometry of a particular window in old Cairo.

http://rogerburrowsimages.com/wp-content/uploads/2017/12/AlatirWindow2.mp4

"3D Thinking" Page 264: The Dynamic Sphere Geometry is a type of 2D and 3D logic that, in the first place, generates "close-packing" tessellating arrangements of circles and spheres that infinitely fill space. Connecting circle and sphere centers or adding clipped tangents or tangent planes, creates two- and three-dimensional lattices from which two- and three-dimensional forms can be extracted. The nature of the geometry is such that the generated lattices triangulate making them very stable and space efficient.

In two dimensional space images and patterns can be extracted from the lattices to form surface designs and perceptual patterns, see "Categories," such as those used in the Altair Design and Images Design books. In three-dimensional space architectural structures can be extracted that will always be in proportion one with another; they can be modular, space-filling, and space-efficient. Stress loads and material usage is also easy to calculate, given the precision of the geometry.

The following animations compliment my latest book, **"3D Thinking in Design and Architecture – From Antiquity to the Future,"** to be published by Thames and Hudson Ltd, April 2018: Amazon USA, Amazon UK, Waterstones UK.

Animation 1, Page 271: An animation of a "first" sequence of seven close-packing sphere arrangements generated by the "Dynamic Close-Packing Sphere," geometry:

http://rogerburrowsimages.com/wp-content/uploads/2015/02/DynamicSphereSample-1.m4v

Animation 2 , Page 284: The animation below shows the "Golden Rectangle Sphere Cluster," that corresponds with the sixth cell of the "first" sequence, Animation 1, (Cell RTR 1.6) – where the cluster will tessellate infinitely in 3D space.

http://rogerburrowsimages.com/wp-content/uploads/2015/02/SpheresGoldenCluster.m4v

CLOSE-PACKING SPHERES: Close-Packing spheres are unique structures in that spheres touch each other and their centers triangulate. Close-packings of equal sized spheres have been known for millennia – to scientists, geometricians, and engineers, from Plato and DaVinci, to modern day chemists and molecular physicists. The manufacturers of almost anything circular or spherical use close packings to most efficiently pack their products, from nano-sized hollow spheres used in solar cells and lithium batteries, to packing tennis balls and optical cables. Structurally close-packing spheres and circles are stable and space efficient whilst their centers and contact points create infinite space-filling lattices. Molecules and atomic structures tend to follow close-packing arrangements and their lattices form many types of polyhedra. Their lattices make some of the most space efficient structures possible.

The "Dynamic Sphere Geometry" is based on algorithmic steps and defined parameters by which circles, or spheres, are allowed to change size and position within imposed limitations of symmetry and momentum. The parameters of the geometry can be changed, new limits imposed, new symmetries, non-symmetries, and the like, can be created to explore a broad range of sphere arrangements. The geometry can serve to "hunt", indefinitely, for new and unique geometrical arrangements and for unique correspondences in three-dimensional space.

Animation 3, Page 272: Shows how the first sequence, Animation 1, tessellates across a two dimensional plane:

http://rogerburrowsimages.com/wp-content/uploads/2015/02/2.-SpheresAcrossPlane2-copy.m4v

Examples of structures generated from 3D lattices follow, Page 288 – where the first is from a tessellating golden-ratio close-packing sphere arrangement and the second is from a tetrahedron-octahedron close-packing: