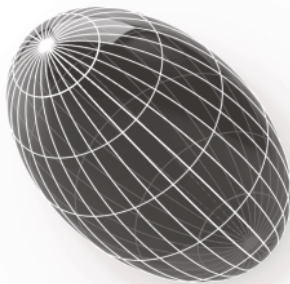


“Exploring Computational Design: La Geometrica Encyclopedia, Volume 0.1”

La Geometrica Encyclopedia, Volume 0.1 – 2D: Computational Design Fundamentals marks the beginning of an ambitious project by M.Arq Javier M Gaxiola (Jamagax). Conceived as both a reference and an evolving platform, this first volume introduces readers to the essential principles and methodologies that define contemporary computational design.

TOPOLOGY



Deformation of a sphere
divided in parallels and meridians

35

THE DEFORMATION OF GEOMETRY

Topology studies geometric transformations that preserve fundamental relationships.

Unlike traditional geometry, it focuses on the continuous deformation of objects, maintaining properties such as connectivity and orientation.

Topological principles apply to various geometric configurations, including shapes that morph without breaking their structural integrity.

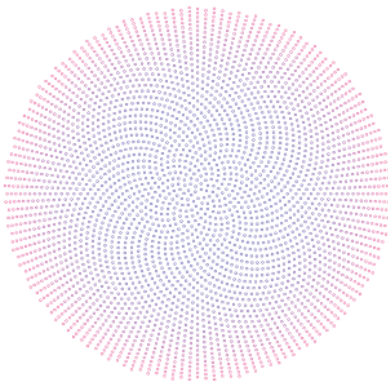
This enables advanced modeling techniques where forms are adapted while preserving essential attributes of shapes and objects.

Common topological families include spheres and ellipsoids or cylinders and toroids, revealing structural similarities despite variations in scale or proportion.

Topology is crucial in computational design, facilitating adaptive, flexible structures that respond to environmental and structural conditions. Applied in architecture, engineering, and parametric modeling, topology enhances digital workflows, allowing dynamic transformations. Its applications extend to generative design, optimization, and organic form development.

36

More than just a book, this edition serves as a living encyclopedia, bridging traditional geometric theory with the digital tools and workflows that are transforming creative industries. From foundational concepts like points, curves, and surfaces to more advanced topics such as topology, parametric modeling, generative systems, and AI-driven design, the volume provides a comprehensive framework for designers, architects, engineers, and artists alike.

Phyllotaxis principle
Spiral

All Geometry is sacred, but commonly spoken "Sacred Geometry" explores the fundamental patterns that underlie natural and cosmic structures, following rules of auto-organizational and efficiency relationships, where mathematical relationships manifest as harmonious proportions. Among these, the Flower of Life represents a universal geometric framework composed of interlocking circles, forming hexagonal symmetry (60° angles) and golden ratio subdivisions.

Like the Phyllotaxis principle, which manifests in nature through the golden angle of approximately 137.5° (or 137° 30' 28"). This specific angle derives from the golden ratio ($\phi = 1.618$) as $360^\circ \times (1 - 1/\phi^2)$. In phyllotaxis patterns, each new element (leaf, seed, or petal) emerges at this precise angle from the previous one, creating spiral arrangements that optimize sunlight exposure and spatial efficiency. The resulting Fibonacci sequence patterns (1, 1, 2, 3, 5, 8, 13, 21, ...) appear as counterrotating spirals, commonly counting consecutive Fibonacci numbers (such as 8 and 13, or 21 and 34) in sunflowers, pinecones, and succulents.

In computational design, these principles translate into parametric frameworks where angles, subdivisions, and symmetrical iterations guide adaptive and generative forms. By embedding sacred ratios into digital workflows, designers integrate aesthetic balance, structural efficiency, and symbolic depth into emergent geometries.

Designed for multidimensional learning, the book is rich with **visual diagrams**, **case studies**, and **digital resources**, including **3D Rhinoceros files**, **Grasshopper scripts**, **Python and C# examples**, and mechanical files for fabrication. These assets empower readers to explore geometry hands-on and apply computational thinking directly to their practice. Notably, all diagrams and icons were created using [Rhino 8](#) and [Grasshopper](#), tools that have been central to Jamagax's creative process since the early days of his career.

As part of a broader vision, *La Geometrica* will continue to grow into a multi-platform ecosystem, including immersive digital editions, 3D-printed collections, VR/AR experiences, and collaborative workshops. It invites designers, programmers, educators, and enthusiasts to contribute, learn, and shape the future of computational design together.



3D surface panelization

Parametric design establishes rule-based relationships between geometric components, enabling real-time adaptability through variable inputs. Parameters define constraints, ensuring proportional integrity across iterative modifications.

By embedding logic into design processes, parametric systems automate complex transformations, enhancing efficiency and precision. Structural optimization refines load distribution and material efficiency, while adaptive templates respond to environmental conditions, improving performance-driven architecture.

Generative techniques expand design possibilities, allowing countless variations from a single data-set. Parametric logic also extends into fabrication, guiding precision-based manufacturing techniques. This approach merges computational precision with creative adaptability, reshaping design methodologies.

[Get the book](#) and dive into this fascinating journey where geometry meets creativity.