THE SIGNIFICANCE OF COMPUTER MODELING OF COMPLEX FRACTAL SHAPES

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Annotation: *The paper presents a simple approach that allows the interactive extension of fractal and L-system methods. Using this approach, a system was developed that allows designers to control each step of the shape creation process, increase the level of interactivity during creation, and use a flexible set of modifiers to achieve different shapes.*

Keywords: *Fractal, L-system, model, IFS-Iterated Function Systems.*

In the principles of computer modeling, there is always a motivation to achieve non-standard forms through a generative design process. In modern architecture, there is great interest in creating complex fractal structures by using rule-based generative systems. Developing new, easier generative routines is important for designers to have many alternatives. Designing iteration rules and recursion depth can lead to interesting results, but defining iteration rules and recursion depth is difficult [1-2].

One of the most important advantages of the system is the creation of ready-to-prototype models using a 3D printer. Using multifaceted surfaces as a key concept provided a connected surface structure ready for 3D printing. This provides ample opportunity to create, evaluate, and produce models in an important feature system.

The article presents a simple approach that allows interactive and three-dimensional expansion of fractal and L-system methods. With the new approach, users can easily create "self-similar" multifaceted surfaces that connect to each other. Dedicated surfaces are suitable for "virtual" computer graphics, where objects are used for display purposes only. However, in architecture, it is usually the physical construction of forms that is important. Shapes must be connected to each other and surfaces must be multi-faceted to create an object. Figure 1 shows how users can create subtle shapes using the method.

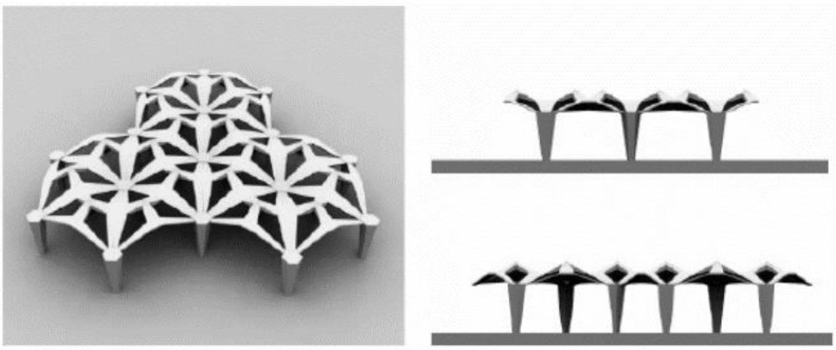

Figure 1. Two types of resulting views of a conceptual structure made up of repeating modules created by the system

Separated polygonal surfaces (if there are multiple individual surfaces) can be printed, but there is no guarantee that the resulting physical object will remain intact. If individual surfaces aren't versatile, they're not even suitable for 3D printing. For example, two methods based on iterated function systems (IFS-Iterated Function Systems) generate a series of broken points or shapes that are never printed [3]. In contrast, the presented method allows for the construction of multifaceted surfaces that are united on a 3D printer.

Landreneau et al recently introduced Platonic extrusions as local network operators. These extrusions are general pipes with the same number of edges in the lower and upper polygons [4].

Platonic extrusions have been applied to some Archimedean extrusions, as shown in Figure 2 in the article.

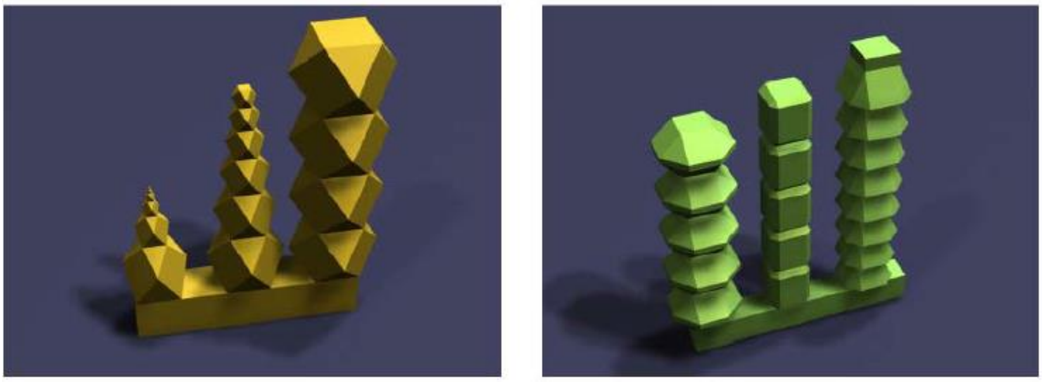

Figure 2. Examples of local network operators

This modeling approach approaches a practical approach based on surface construction modeling. This approach is particularly useful in architectural concept modeling, where users can quickly determine the effects of different approaches by repainting surfaces. With this approach, users can quickly learn how to create fractal-based self-similar multifaceted shapes. The method can be used not only in the fractal view, but also to create various shapes.

LITERATURE:

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