Proposal for Advanced 3-Dimensional Modeling Environment

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Taro FUJI 1，Hana KEIO2

Authors Name: 12pt Arial

1Rippoutai Modeling Co., Ltd., 2University of Future Technology

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【Abstract】

This research proposes a new modeling method for 3D objects. This method enhances a linkage between simulations and modeling, and it leads to enrich fabrication abilities of 3D printers directly. In this method, each voxel can store various information such as color, material, link which describes relationship to neighbor voxel) and attributes defined by users. And it will support to simplify flows of 3D data and work together with simulations. Thus, it will contribute to improving the value of applications using 3D printers.

Keywords:3D, simulation, modeling, voxel, attribute

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1. Introduction

Instead of describing only the surface of a 3D model with a mesh (polygon) as in conventional 3D data formats, the 3D model is represented with voxels, which are the basic elements of 3D, such as cubes and spheres. Various attributes can be defined for each voxel, including color information such as RGB and CMYK, and material information such as ABS resin and nylon. FAV enables the creation of highly expressive three-dimensional objects, including the detailed design of the distribution of multiple materials, such as hard and soft materials, and the free design of intricate internal structures.

2. Concept

FAV stands for FAbricatable Voxel. 3D model data described in FAV format is fabricatable, meaning that it is stored as optimized information for use in manufacturing. Optimized information that can be used for manufacturing indicates the following.

3. Conclusion

Since voxels can be used to define 3D shapes, it is possible to represent various structures such as microstructures, endohedral structures, and repetitive structures by combining different types of voxels, or by combining with and without voxels. The following advantages can be obtained by defining a three-dimensional object with a stack of basic elements called voxels.

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Fig.1. Example of 3D model description by FAV

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Reference

1. A. Masumori, H. Tanaka, “Voxel-based 3D Processing for 3D Printing”, NIP31 (2015), pp.285.

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