4-D/n-D Computer Aided Design

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1. Introduction

In industrial design field, designers draw sketches in 2-D, while their final products must be defined in 3-D. (Very few designers directly make 3-D models.) How come they prefer 2-D to 3-D? They are lacking ability of imaging 3-D models? No. Definitely not.

The biggest reason for designers of drawing 2-D images before actually building 3-D models is that the 2-D sketches are easier to handle with than 3-D models like industrial clays or Computer Aided Design (CAD) models. Recent development of computer and interaction technologies, including intuitive 3-D digital modeling tools like virtual reality and haptic technology based modeling device, make a reasonable amount of designers able to develop 3-D models as easy as they are drawing 2-D plans.

There seems no reason to stop in 3-D. The authors claim that some designers (including the authors themselves) are able to think forms in 4-D. This is the strong reason why the authors started developing 4-D CAD.

2. 4-D/n-D Computer Aided Design

The authors have developed a prototype system of 4-D CAD. Naturally we cannot see the fourth dimension in normal way, the 4-D CAD shows four cutting edge of 4-D space simultaneously on computer screen. Designers can edit parameters of 4-D spherical harmonics so that theoretically they can make any shape in 4-D. The CAD system immediately respond designers' input so that designers can easily realize their images. Figure 1 and 2 demonstrates 4-D objects created on the proposed CAD system.

As a future work, the authors are currently planning to develop topology design system, based on research on design of Artificial Heart by Kazuo Kawasaki.

3. Concluding Remarks and Future Works

The authors introduced 4-D CAD system. The authors are currently planning to fill another big hole of the 3-D Euclidian space: the topology. Figure 3 shows a screenshot of developing topology CAD system.