Generation of a 3D gear aggregate model that approximates the shape of a specified 3D model

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In the field of computer graphics research, there are many methods of generating a 3D aggregate model that approximates the shape of a specified 3D model. Such 3D aggregate models of many user-specified 3D models have been composed.

A gear is often used as a symbol in, for example, such as national flags, national emblems, clip arts, and movies. Further, an assembly of multiple gears engaged with each other is often used as a symbol.

Traditional methods can generate a 3D gear aggregate model that approximates the shape of a specified 3D model. However, in such 3D gear aggregate models, the gears do not engage each other.

This thesis proposes a method for generating a 3D gear aggregate model that approximates the shape of a specified 3D model. Unlike a 3D gear aggregate model generated by traditional methods, the 3D gear aggregate model generated by the proposed method consists of many engaged 3D gears of different size. Moreover, it is possible to rotate all engaged gears if one of them is rotated.

In this thesis, involute spur gears are used. The outline of the method is as follows. First,a specified 3D model is divided into multiple planar cross-sections. Then, each cross-section is filled with gears, by placing the gears one by one according to a defined score. The score of a gear is calculated according to its engagement and size. Using this method, e it is possible to generate a 3D gear aggregate model representing an approximated shape of a specified 3D

model.