

数字农业 农机装备

基于L-系统规则组合机制的植物建模新方法

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摘要:

L-系统是基于植物学规则进行树木建模的经典方法之一,已被广泛地应用于虚拟植物生成与应用中,但在实际建模中还存在规则提取难,建模周期长等问题。针对这个问题提出了L-系统规则组合的建模新方法,该方法利于树木形态及生长规则的复用,从构建基本的分枝结构、叶序、花序和果实等器官不同造型库出发,并结合相关的植物形态学、植物生理生态学知识和野外实测的树木形态因子数据,进行器官模型组合,最终形成树木三维几何模型。最后以龙眼树等为建模实例,基于该方法快速实现了三维建模,取得了较好的效果。目前该方法较适于构建具有复杂器官的高大乔木,还不足以模拟所有的植物,通过介绍该方法,希望在一定程度上降低L-系统建模的难度,达到快速建模的目的。

关键词: 虚拟植物;L-系统;规则组合机制;龙眼树

A New Plant Modeling Method Based on Rule Compound Mechanism of L-System

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Abstract:

L-System is a dominant method for tree modeling based on botanical rule, which has been widely used in virtual plant modeling and application. However, great challenge still existed in practice, such as difficulties in extraction of L-system rule and inconvenience in modeling. In order to solve these problems, L-system rule compound modeling method was present, which is beneficial for reuse of tree morphologic geometry and growing rule. Based on various basic libraries composed of ramification, phyllotaxis, inflorescence, fruit and others, the method constructs 3D geometric tree model by assembling different organ models from those libraries and integrating the knowledge of plant morphology and physioecology along with the measured data of plant morphological factors. This method is proved well by achieving the 3D longan tree and other tree models quickly. At present, it is more suitable for tall tree with complex organs, but not all plants. By introducing this method, we hope to reduce the difficulty of L-system modeling and to achieve the purpose of rapid modeling.

Keywords: virtual plant L-system rule compound mechanism longan tree

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