

## 基于NURBS和VC++6.0的棉花生长可视化研究

### Visualization of cotton growth based on NURBS and VC++6.0

投稿时间: 2006-1-6 最后修改时间: 2006-6-5

稿件编号: 20061034

中文关键词: NURBS; OpenGL; C++; 棉花; 生长模型; 可视化; 拓扑结构

英文关键词: NURBS; OpenGL; C++; cotton; growth model; visualization; topological structure

基金项目: “十五863”农林植物生长模型与数字化设计技术研究”(2003AA209020)

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中文摘要:

该文介绍了用NURBS曲面方法建立棉花的各种叶子、铃、花瓣等器官三维模型的方法, 结合C++面向对象技术, 实现了棉花生长可视化。提出了基于器官图像获取棉花造型控制点二维坐标的准确、简便的方法, 给出了一种解决器官的形状归一化问题的方法。与三维数字化等方法相比, 省去了进行大量精确数据的测量和数学表达式的拟合工作。棉花的主茎、果枝的各节采用OpenGL提供的基本几何图形组合成8面棱柱来建模, 棉花的拓扑结构通过C++类来描述, 在VC++6.0下结合OpenGL实现了棉花生长模拟的可视化, 取得了较逼真的效果。

英文摘要:

This paper presents a method of modeling cotton organs in three-dimensional images based on NURBS, which realizes the visualization of cotton growth by using Object-Oriented Programming. To build a NURBS surface, a convenient and accurate method for obtaining 2D(X,Y) coordinates of control points based on cotton image was proposed. Solution of 3D organ normalization was discussed. With NURBS there is no need to obtain an abundance of accurate data and to bother with regression equation as compared with three-dimensional digital method. Burls of stem and fruit branches were modeled by octahedral prism. Other organs were built based on NURBS, such as caulis leaf, fruit branch leaf, bell, petal and bract. Topological structure of cotton is represented by C++ class: stem class and fruit branch class. Based on VC++6.0 and OpenGL, the methods for establishing models of main cotton organs using techniques of computer graphics were presented and realistic results were achieved.

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