

## 马铃薯挖掘铲计算机辅助分析与模拟试验研究

### Computer aided analysis and simulation experiment of potato digging blade

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英文关键词: agricultural machine; potato harvesting; digging blade; virtual design; CAA; simulation test

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| 作者  | 单位  |
|-----|---|
| 贾晶霞 | (1977-), 女, 河北人, 博士研究生, 研究方向: 机械装备与计算机测控。北京清华东路17号中国农业大学(东校区)508信箱工学院, 100083。Email: jiajingxia@126.com |
| 张东兴 | (1958-), 男, 河北人, 博士生导师, 教授, 从事机械装备与计算机测控研究。北京中国农业大学(东校区)174信箱工学院, 100083。Email: zhangdx@cau.edu.cn      |
| 桑永英 | 中国农业大学工学院, 北京 100083  |
| 杨欣  | 河北农业大学机电工程学院, 保定 071001   |

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中文摘要:

针对马铃薯挖掘铲工作阻力大这一难题, 采用参数化特征造型软件Inventor进行挖掘铲虚拟设计, 基于土壤与铲体作用动力学分析, 建立了挖掘铲牵引阻力数学模型。通过计算机辅助分析(Computer Aided Analysis, CAA)手段, 使用Visual Basic语言编程实现了挖掘铲牵引阻力与前进速度、铲面倾角、挖掘深度、工作幅宽等主要影响因素的模拟试验, 最终确定了挖掘铲设计参数, 并在虚拟装配体中进行参数调整改进模型。土槽台架试验结果与计算机模拟试验结果基本吻合, 验证了CAA过程和模拟试验的有效性, 田间收获试验结果显示马铃薯收获质量达到了设计要求, 验证了挖掘铲几何参数的合理性。研究结果为其它农机具研究设计提供了一种参考。

英文摘要:

In order to solve the problem of big resistance in digging potatoes, the virtual design of digging blade was made by using Inventor, a parameter feature modeling software, and the draught resistance mathematic model was set up based on dynamics analysis of digging blade and soil. Simulation tests between the resistance and the main factors, such as working velocity, obliquity of blade, digging depth, digging breadth, were done by visual basic on Computer Aided Analysis(CAA), the design parameters of digging blade were confirmed and put into the virtual model to redesign the digging blade, at last the digging blade was manufactured, the draught resistance tests in the soil groove and the harvesting tests in the field were carried out. The draught resistances were consistent basically between the simulation tests and the soil groove tests, which showed that the CAA program and the simulation tests were effective and feasible. The field harvesting test results show that the harvest quality is better, these results also prove that the digging blade parameters are reasonable. This method, through CAA, simulation tests, and virtual design, may provide a reference for other agricultural machine design.

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服务热线: 010-65929451 传真: 010-65929451 邮编: 100026 Email: tcsae@tcsae.org

