

椭圆齿轮行星系分插机构推秧装置的动力学模型的建立及验证

Establishment and verification of dynamics model of seedling-pushing device in transplanting mechanism with planetary elliptic gears

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英文关键词: dynamics analysis; seedling-pushing device; transplanting mechanism with planetary elliptic gears; high-speed rice transplanter

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中文摘要:

为了建立高速水稻插秧机椭圆齿轮行星系分插机构的动力学模型, 必须分析推秧装置对该机构的作用。该文采用作者推导的解析形式刚体复合运动微分方程对该机构的推秧装置进行动力学分析, 推导出推秧装置的动力学模型。通过编程计算得到: ①推秧和碰撞过程行星架转角与拨叉转角及推秧杆位置的关系, 并由高速录像验证; ②在推秧和碰撞过程拨叉转动中心受力、推秧杆对栽植臂作用力和弹簧作用力与行星架转角的关系, 为分析整个分插机构的动力学特性奠定基础。

英文摘要:

In order to set up the dynamics model of the transplanting mechanism with planetary elliptic gears of high-speed rice transplanter, the effect of seedling-pushing device on it must be analyzed. In this paper, the dynamics characteristics of seedling-pushing device were analyzed by method which was derived by authors. The method is analytical form differential equations of rigid body compound motion. As a result, the dynamics model of seedling-pushing device was deduced. By programming calculation, some conclusions were drawn: ①the relationship between the angle of gears trunk and the angle of shifter and the position of seedling-pushing rod in the course of seedling-pushing and collision, which were tested and verified by high-speed Video Tape Recorder; ②the relationship between the angle of gears trunk and the bearing force of spring, shifter shaft and seedling-pushing rod in the course of seedling-pushing and collision. These conclusions provide basis to analyze this kind of transplanting mechanism.

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