

机身倾斜导致谷物流量传感器零点漂移的补偿 Zero-drift Compensation of Impact-based Grain Flow Sensor for Tilted Combine Harvester

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关键词: 冲击式 谷物流量传感器 倾斜 零点漂移 补偿

摘要: 当联合收获机倾斜时谷物流量传感器因发生严重的零点漂移而导致较大的测量误差。通过对单板冲击式谷物流量传感器的倾斜试验发现,传感器的零点电压与联合收获机的倾斜角度成线性关系,当联合收获机左右倾斜 $15^\circ$ 时,零点漂移电压达25.4 mV,可能导致-8.3%~28%的测量误差。为了消除倾斜导致的零点漂移,在单板冲击式流量传感器后面增加一个与冲击板结构相同的参考检测板,构成双板差分冲击式谷物流量传感器。倾斜试验发现,在联合收获机左右倾斜 $15^\circ$ 范围内,冲击板和参考板的零点电压的变化一致,使用差分算法补偿后的零点漂移从25.4 mV降低到1 mV。Zero-drift of the grain flow sensor leads to a significant error when the combine harvester tilted. The purpose of this paper is to study the effects of combine harvester tilt on the zero-drift of the impact-based grain flow sensor, and propose an innovated grain flow sensor that can stabilize zero-drift when combine harvester titled. With the single plate impact-based grain flow sensor fixed in a combine harvester, the zero-drift voltage of the grain flow sensor is recorded while the combine harvester tilted between  $-15^\circ$  and  $15^\circ$ . The test result shows that there is a linear relationship between the zero-drift and the obliquity, and the zero-drift voltage is 25.4 mV when the combine harvester tilted at  $15^\circ$ . A dual-plate differential impact-based grain flow sensor is developed to compensate the zero drift. The tilt experimental results show that the zero-drift of the two plates are consistent each other, and thus the overall zero-drift voltage of the sensor is reduced from 25.4 mV to 1 mV.

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