

地面灌溉水深测量仪的研制及性能测试

Development and performance measurement of water depth measuring device applied for surface irrigation

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中文摘要:

对地面灌溉条件下水流扩散过程实时监测是地面灌溉系统田间评价的主要内容, 观测数据为相应的数值模拟和系统性能评价奠定了基础。该文介绍了一种研制的梯度式地面灌溉水深测量仪, 可在田间任意地点实现地表水深(位)变化过程和水流推进与消退时间的自动监测。室内外测试结果表明: 仪器对地表水深(位)动态变化过程的反应灵敏, 水深测量精度为 ± 5 mm, 但当仪器应用于首次灌溉的田块时, 松软地面造成的仪器沉降对水深测量精度可能的影响范围为 8 ± 3 mm, 在后续使用时就可以忽略仪器沉降的影响。仪器对地面水流推进时间的测定精度相对较高, 相对误差小于11%, 但测得的水流消退时间与人工观测结果最大相对误差为29%, 表明使用仪器进行水流消退时间观测时有一定的条件限制。研制的仪器可基本满足地面灌溉试验中对地表水深(位)进行动态监测的需求。

英文摘要:

The real-time monitor flow diffusion process under surface irrigation is the key content of field evaluation of surface irrigation system. The real-time measurement data supply fundamental basis for numerical simulation and system capability evaluation. A water depth measuring device applied under surface irrigation condition was developed and measured. It can automatically measure and record the variation of water depth at given points, as well as the advance time and recession time. The device has been examined under the indoor and the field conditions. The application results show that the adopted sensor is sensitive to the dynamic variation of the water depth with measuring precision ± 5 mm. However, the depression of the device caused by the irrigation could produce (8 ± 3) mm errors for water depth measuring when the field is irrigated firstly. The effect of the depression could be omitted for succeeding irrigation. The device shows high precision for measuring advance time with the relative error is less than 11% while the maximum relative error for recession time is 29%, indicating the limitation to use the device for measurement of recession time. The device could be basically satisfactory for the dynamical measurement of water depth for surface irrigation.

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