张国祥,丁苏疆.对微灌滴头水流流态若干问题的思考及补偿机理的探索[J].农业工程学报,2012,28(1):78-81

对微灌滴头水流流态若干问题的思考及补偿机理的探索

Some problems of water flow pattern and compensation mechanism for micro-irrigation emitters

投稿时间：10/10/2011

中文关键词: 灌溉,水力学,流量,补偿,微灌滴头,流态,水温修正,无弹性件

英文关键词: irrigation hydraulics flow compensation micro-irrigation emitters the flow pattern water temperature modification inelasticity elements

基金项目:

作者	单位
张国祥	新疆泓科节水设备制造有限公司，乌鲁木齐 830000
丁苏疆	新疆泓科节水设备制造有限公司，乌鲁木齐 830000

中文摘要:

滴头水力计算对于管道工程设计是十分重要的。该文研究了压管道水流流态划分的依据与水流条件、滴头工作水头与管流沿程损失水头的区别，及滴头流量的水温修正。并对无弹性件滴头流态指数x＜0.5的现象，作了机理探讨，提出了“面积补偿”法。结果表明：1）将尼古拉兹水力实验成果为依据的有压管流流态套用于滴头水力计算中（除微管滴头外）是错误的；2）认为对流态指数x=1的滴头，按层流流态对滴头流量做水温修正是正确的；对x≤0.5的滴头，不需做流量的水温修正，原因在于流道内基本上全为局部损失，而不是滴头流态为紊流阻力平方区；对1＞x＞0.5的滴头，目前可不做水温修正，可在滴头水力试验中使用设计温度的水，获取符合水温要求的水力关系。3）对于滴头流态区分，仅对已基本淘汰的微管滴头有必要，对其余滴头并无实际需要，应于放弃。4）无弹性件滴头x＜0.5的现象机理是“面积补偿”，即过流面积随水头增大而减小，原因是流道边界的急剧变化和水流惯性与水头（流速）正相关。

英文摘要:

Hydraulic calculation of micro-irrigation emitters is important for pipeline engineering design. Classified basis of water flow pattern and the flow condition of pressure pipes, the differences of the operating head of drip?emitters and frictional head loss flow modification, and water temperature modification of dripper discharge were studied. Then the reason for flow stance index x＜0.5 observed in hydraulic measured data of inelasticity elements was analyzed, and the method of area compensation was proposed. Results show that: 1) it’s wrong that the water flow pattern in pressure pipes based on Nituradse’s experimental results were applied in hydraulic calculation of micro-irrigation emitters except for microtubule drippers; 2) water temperature modification of drippers should be done for flow stance index?x=1, not for x≤0.5 not because flow state is at drag square area but because loss of pipes are presented as local loss and not for 1＞x＞0.5 respectively. The hydraulic relationship at different water temperature can be got by hydraulic experiments at corresponding water temperature for drippers of 1＞x＞0.5; 3) the way of classifying water flow pattern of drippers should be abandoned because this way just suitable for microtubule drippers cannot be applied for others; and 4) the reason for x＜0.5 of is area compensation effect, which means the area of passage decreased with water head increased, because of rapid changes for flow channel boundary and a positive correlation between the flow inertia and the water head.

查看全文 下载PDF阅读器

关闭