

根系吸水模型参数的混合遗传算法估算方法Inverse Method Estimating Root Water Uptake Model Parameters Using Hybrid Genetic Algorithms

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关键词: 根系吸水模型 参数优化 混合遗传算法 Levenberg-Marquardt算法

摘要: 构建了遗传算法与Levenberg-Marquardt算法相结合的混合遗传算法,用于求解根系吸水模型参数。分别进行数值试验和棉花根系吸水试验对混合遗传算法求解精度进行验证。数值试验表明,采用混合遗传算法优化求解根系吸水模型参数的优化值具有较高的精度,含水率资料的时间步长和空间步长对根系吸水模型参数的优化精度有较大影响,在实际中时间步长可取值5~10d,空间步长取值5~10cm。对室内棉花根系吸水进行模拟分析,结果表明混合遗传算法求解的根系吸水模型可以很好地模拟根系吸水。该方法可用于求解根系吸水参数。The hybrid genetic algorithm combined with Levenberg-Marquardt optimization algorithm was established to estimate root water uptake model parameters. A series of numerical experiments and root water uptake were conducted to verify the model. The results indicated that the optimized value of the root water uptake model parameter optimized model with the hybrid genetic algorithm has a higher precision. The time and space interval of soil water content had a great influence on the root water uptake model parameter's optimized precision. In practice, it is recommended to choose 5~10d for time interval and 5~10cm for space interval. Furthermore, the inverse method was applied to simulate the average root water uptake rate distributions of cotton. The simulated results showed that the optimized model solving the root water uptake model can simulate the root water uptake of cotton, to solve the root water uptake parameter.

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