

三角绕流滴灌水器结构设计和优化 Structural Design and Optimization of Triangle Circulation Drip Irrigation Emitters

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关键词: 灌水器 三角绕流 水力性能 数值模拟 结构优化

摘要: 以三角绕流滴灌水器结构的流道单元为研究对象, 利用Pro/E软件完成灌水器造型设计, 结合计算流体动力学软件Fluent 6.3模拟分析流道的水力性能, 研究此类灌水器的湍流特性, 揭示其内部湍流流动机理, 并对流道结构进行优化。根据分析结果, 通过改变外部大三角的形状与内部小三角的形状和位置, 对流道单元进行结构优化, 得出一种流态指数小于0.5, 流道内速度分布均匀, 流量在滴灌允许范围内, 抗堵性能优良的三角绕流灌水器结构。Computational fluid dynamics software Fluent 6.3 was adopted to simulate the flow of triangle circulation drip irrigation emitters, the models were built by 3-D software Pro/E. By analyzing the flow hydraulic performance and the turbulence characteristics of emitters, the mechanism of internal turbulent flow was revealed, the flow structure was optimized. Based on the simulation results, by changing the shape and position of the external and the small internal triangular, a new type of triangle circulation drip irrigation emitter with flow index of less than 0.5 was got, velocity distribution was uniform, within the allowable flow range and excellent anti-clogging performance. A theoretical basis for the triangle circulation emitters structure design and quantitative analysis was provided.

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