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Hydraulic Characteristics for Predicting Water Distribution of Self – Compensating Gated Pipe Irrigation Technique

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Abstract: Predicting water distribution and maximizing water efficiency became the priority of irrigation planners and users under Egyptian conditions. Therefore, the aim of this study the hydraulic performance analysis of self-compensating gated outlet (SCGO) 50 mm outlet diameter. As well as, field evaluation of modified (SCGO) gated pipe irrigation technique compared with traditional, for predicting water flow along Pipeline. It was carried out using two P.V.C pipe lines of 110 mm diameter and 50 mm outlet diameter, and three outlet gate spacings between gates (0.7, 1.0 and 1.5 m). Hereby field experiments were carried out at the Experimental Farm of Faculty of Agriculture, Ain Shams University, Kalubia Governorate, Egypt, which represents alluvial soils. Results revealed that. In laboratory experiments the discharge l s^{-1} was measured for (SCGO) under different operating pressure in the range (0.08-0.28 bar). The gate discharge under different operating pressure kept around 0.52 l s^{-1} for 50 mm, outlet diameter, with coefficients of variation less than 0.09%.. The discharge l s^{-1} was measured for traditional and modified gated pipe at different gate spacings of 0.7, 1.0 1.5 m between gates. In general, there was a slight variation in discharge between first and last gate for modified gated pipe under 0.7, 1.0 and 1.5 m outlet spacings. As the data indicated a slight discharge variation between all gates under 1.5 m spacing there was more discharge variation under 0.7, 1.0 m gate spacings for traditional gated pipe. The relationship between measured and predicted values of discharge along the pipeline for traditional and modified gated pipe under 0.7 , 1.0 and 1.5 m gate spacings, reflected a very good agreement between the predicted and measured values. There is a good indication to predict and estimate the water flow characteristics of the gated pipe.

Key words: Hydraulic characteristics, water flow, gated pipe, simulation model, water distribution.

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