



دانشگاه شاهرود

Faculty of Water & Soil

Department of Irrigation

M.A. Thesis in Irrigation and Drainage Engineering

Presenting a Simple Way to Design Surface Irrigation

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Abstract

Despite of widely usage of surface irrigation, due to the low efficiency, in this method performance level of crops is low. Appropriate combination of cutoff time, length and discharge in irrigation fields are among the criteria that lead to high efficiency in surface irrigation. The purpose of this study is to present a method for determining the cutoff and the optimum length and optimum inflow rate in closed and open end irrigation. The basic assumption in this design method is that the point along the field where the lowest water depth permeates should receive water equal to the required depth. For this purpose, data from 18 border strips including uncultured border strips and cultivated border strips and slopes of 0.001 to 0.005, roughness 0.017 to 0.21, length of 100 m and discharge of 0.08 to 0.16 M³ / min and 5 furrow field data series including Benson-221, Prints-323, Machet-233, Walker-1989 and Merkel-1983 data are used. In this method, after determining the different irrigation phases and determining the cutoff time, the efficiency of application was compared with the inertial model of zero in this study. WinSRFR 4.1 software was used for zero inertia method. The results showed that the application efficiency obtained from both methods was close to each other. Highest similarity of results in closed end border strips for R-6, R-13, R-14 and R-17 border strips with 0% difference and the highest difference was for R-1 border strip with 8.67% difference in efficiency. Also, the highest similarity of the results in the open end border strips was related to R-14 border strip with 0.03% difference and the highest difference was with R-10 border strip with 0.552% difference. In the furrow tested, after determining the cutoff time, acceptable application efficiency was obtained, and the optimum length and discharge were determined so as to maintain maximum application efficiency, reducing infiltration losses and reducing irrigation volume. According to the results of closed border strips, maximum efficiency was obtained in some border strips with decreasing length and initial discharge and in some border strips with increasing length and initial discharge. In the open end border strips, maximum efficiency was obtained in all border strips with increasing length and decreasing flow rate.

Keyword: surface irrigation, border strip irrigation, furrow irrigation, open end and closed border, closed furrow, WinSRFR