

Kasem Pinthong 2012: Sprinkler System Layout Design Algorithms and Software Interface. Doctor of Engineering (Water Resources Engineering), Major Field: Water Resources Engineering, Department of Water Resources Engineering. Thesis Advisor: Associate Professor Suwatana Chittaladakorn, Ph.D. 137 pages.

The main objective this research was solid-set sprinkler layout software development in which the USUKU model was developed with a GIS interface (as a Mapwindow Plug-in) for integrating water application uniformity calculations, a pipe hydraulic model, and irrigation sprinkler pipe system layout.

The two main objectives of the water application uniformity module used for USUKU: (1) existing projects by evaluating water application uniformity; and, (2) for designing a new sprinkler system by evaluating the expected water application uniformity as calculated from a hydraulic analysis. Both evaluation results can be presented in a water application map, and characterized as a water application uniformity coefficient.

The pipe hydraulic module for USUKU is branching hydraulic model based on a gravity-fed concept and was specifically developed for sprinkler and trickle irrigation. The golden section search method was applied in the model. The Dijkstra algorithm is used to create flow paths from the water source to all nodes. The flow accumulation can be created by duplicate path links.

The irrigation sprinkler pipe system layout module is a pipe layout editor. This is used to create pipe layout data for the hydraulic module and water application module. The results of the hydraulic module and water application module are used to evaluate and select alternative pipe layouts for a given topography and field shape.

Student's signature

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Thesis Advisor's signature