

**ASSESSING THE FEASIBILITY OF USING PEDOTRANSFER
FUNCTIONS AND AUTOMATIC CALIBRATION METHODS FOR
ESTIMATING DRAINMOD INPUTS**

By

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A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of
DOCTOR OF PHILOSOPHY
In
IRRIGATION AND HYDRAULICS

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Summary:

DRAINMOD is one of the widely used hydrologic models for drainage water management. Direct measurements of soil parameters are time consuming and costly compared with indirect methods such as Pedotransfer functions (PTFs) and automatic calibration. The goal of this study was to assess the feasibility of running DRAINMOD using input parameters estimated by PTFs or adjusted by automatic calibration process.

First, all available PTFs that predict Ksat and SWCC have been evaluated. Then, the feasibility of running the model using inputs predicted by the best performing PTFs was tested. Finally, developing an automatic calibration framework for calibrating nine model inputs and compared the model outputs with the case of manual calibration. DRAINMOD shows a good performance in predicting subsurface drainage compared to its predictions using measured/calibrated inputs. Also, automatic calibration was found to be an effective and efficient tool for determining the model inputs compared to the manual calibration.