Association Française pour l'Etude des Eaux

DOCUMENT NON SELECTIONNE

Trop spécialisé ☐
Sans intérêt ☐
Pas de mon domaine ☐
Pas le temps ☐

NUMERO G-11329

NOM : M. le Prof. J. MANIA

DATE ENVOI : 26 DEC. 1990

DATE RETOUR : 29 JAN. 1991

66 / 72508

*AUTEURS .WANAKULE N,MAYS LW,LASDON LS

*TYPE .RAPPORT

*TITRE .Development and testing of a model for determining optimal pumping and recharge of large-scale aquifers

*SOURCE .AUSTIN,UNIV TEXAS, CRWR,

*DATE .1985

*PAGES .137, CRWR N°217.

*COTE .G11329

References

Titre original :

Exploitation d'un grand aquifère. Description d'un programme d'optimisation GWMAN. Branchement sur un modèle 2D. Discussion sur la préparation des données et application à un bassin calcaire du Texas. G 11329.

Technical Report

CRWR-217

Development and Testing of a Model for Determining Optimal Pumping and Recharge of Large-Scale Aquifers

CENTER FOR RESEARCH IN WATER RESOURCES
BUREAU OF ENGINEERING RESEARCH

College of Engineering
The University of Texas at Austin
Austin, Texas

ABSTRACT

A methodology is developed for determining optimal pumping and recharge of large scale artesian and/or nonartesian aquifers. This methodology couples optimization techniques with existing groundwater simulation models. It can be applied to both groundwater policy evaluation (allocation) such as large-scale aquifers and to hydraulic management problems such as the dewatering of mining or excavation sites. The state variables which represent the heads, and the control variables which represent the pumpages, are implicitly related through the groundwater simulator. The simulator equations are used to express the states in terms of the controls, yielding a much smaller reduced problem. Techniques for computing gradients of reduced problem functions are described. The reduced problem is solved by combining augmented Lagrangian and reduced gradient procedures. The two models coupled are the University of Texas generalized reduced gradient code GRG2 and the Texas Department of Water Resources groundwater simulation model GWSIM. The overall model is referred to as GWMAN.

Applications using both hypothetical and actual situations for various aquifer conditions are presented to illustrate the models capability. Both steady-state and transient type dewatering problems are solved, and an application to the Edwards Aquifer in Texas in presented. This aquifer has both artesian and non-artesian conditions resulting in a nonlinear programming problem with 1765 decision variables, 1510 general constraints, and 3530 flow and head bound constraints. Solutions to these problems are presented and discussed.

A detailed user's manual is provided that describes in detail the input and output procedures of the model. Also, descriptions are provided to illustrate how different types of applications can be solved using the model.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)