

## ABSTRACT

Generation of Representative Geologic Strata Suitable  
for Simulation of Fluid Flow. (January 1970)

Barry Lynn Bateman, B. A., Texas A&M University;

M. S., Texas A&M University;

Directed by: Dr. Dan D. Drew

Dr. Paul B. Crawford

A numerical simulation method was developed to generate typical geologic strata and to solve two-dimensional reservoir problems of the type encountered in water injection of wells. The method includes more variables and is more generally realistic than any available method designed to study fluid flow in heterogeneous rock reservoirs. Emphasis was placed on simulating the heterogeneous nature of rock and the study of the effects on fluid flow resulting therefrom. An implicit pressure-explicit saturation finite-difference scheme was developed to solve the partial differential equations which describe two-dimensional fluid flow.

The method was designed to simulate a porous, permeable geologic strata containing two contiguous, immiscible fluids. The properties of the geologic strata were generated in a random manner which utilized the relationships which exist between permeability

and porosity, water saturation and capillary pressure, and water saturation and relative permeability. The effects of gravity, height above the water-table, and the densities and viscosities of the fluids were also included in the calculations.

The flow of fluids in the reservoir was calculated for various injection rates and time intervals. All time varying coefficients of the partial differential equations are calculated and exhibited at the end of each time cycle. Changes in water saturation and oil saturation are considered in making a material balance. The results from this model compare favorably with known physical phenomena.