e-journal of reservoir engineering, Vol 1, No 1 (2005)

HOME ABOUT LOG IN REGISTER SEARCH CURRENT

ARCHIVES

Home > Vol 1, No 1 (2005) > Guo

Testing of New High-Order Finite Difference Methods for Solving the Convection-Diffusion Equation

Boyun Guo, Xiangwen Wang

Abstract

Numerical simulation has become a common means of predicting performance of oil and gas reservoirs in the petroleum industry. It is also a time-consuming task due to the large dimension of the simulation grids and computing time required to complete a simulation job. Commercial software packages used in the petroleum reservoir simulation employ the first-order-accuracy finite difference method to solve the convection-diffusion equation. This method introduces numerical dispersion because of truncation error caused by neglecting higher-order terms in Taylorâ s expansion.

This study focused on providing solutions to the above problems. We developed and tested two new algorithms to speed up computation and minimize numerical dispersion. In this research, we have derived the second- and third-order accuracy finite difference formulations to solve the convection-diffusion equation and applied a counter-error mechanism to reduce numerical dispersion. The results indicated that the use of the second- and third-order accuracy finite difference formulations can speed up numerical simulations and retain a sharp displacing front controlled by the physical diffusion coefficient.

Full Text: PDF

(cc)) BY

This work is licensed under a Creative Commons Attribution 3.0 License.

ejre Vol 1, No 1 (2005)

TABLE OF CONTENTS

Reading Tools

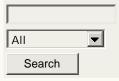
Testing of New Hi...

Guo, Wang

Review policy About the author How to cite item Indexing metadata Print version Look up terms Notify colleague* Email the author*

RELATED ITEMS Author's work Book searches Relevant portals Related studies Pay-per-view Directories Online forums Teaching files Multimedia Government policy Media reports Web search

SEARCH JOURNAL



(cc)) BY

This work is licensed under a Creative Commons Attribution 3.0 License.

CLOSE

* Requires registration