

Author's Accepted Manuscript

Generating One-column Grids with Fractal Flow Dimension

Christine Doughty



PII: S0098-3004(16)30695-1
DOI: <http://dx.doi.org/10.1016/j.cageo.2016.11.010>
Reference: CAGEO3870

To appear in: *Computers and Geosciences*

Received date: 2 June 2016
Revised date: 17 November 2016
Accepted date: 21 November 2016

Cite this article as: Christine Doughty, Generating One-column Grids with Fractal Flow Dimension, *Computers and Geosciences* <http://dx.doi.org/10.1016/j.cageo.2016.11.010>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

GENERATING ONE-COLUMN GRIDS WITH FRACTAL FLOW DIMENSION

Christine Doughty

Energy Geosciences Division Lawrence Berkeley National Laboratory #1 Cyclotron Rd, Mailstop
74/316C Berkeley, California, USA 94720

CADoughty@lbl.gov

ABSTRACT

The grid generation capability built into the numerical simulator TOUGH for multi-phase fluid and heat flow through geologic media can create one-column grids with linear or radial geometry, corresponding to one-dimensional or two-dimensional radial flow, respectively. The integral-finite-difference-method that TOUGH employs for spatial discretization makes it very simple to generalize the grid-generation algorithm from integer to non-integer (fractal) flow dimension. Here the grid-generation algorithm is generalized to create one-column grids with fractal flow dimension ranging from less than 1 to 3. The fractal grid generation method is verified by comparing numerical simulation results to an analytical solution for a generalized Theis solution for integer and non-integer flow dimensions between 0.4 and 3. It is then applied to examine gas production decline curves from hydraulically fractured shale that is modeled as a fractal-dimensioned fracture network with flow dimensions between 0.25 and 3. Grids with fractal flow dimension are useful for representing flow through fracture networks or highly heterogeneous geologic media with fractal geometry, and may be particularly useful for inverse methods.

Download English Version:

<https://daneshyari.com/en/article/4965422>

Download Persian Version:

<https://daneshyari.com/article/4965422>

[Daneshyari.com](https://daneshyari.com)