Discrete Fracture Model For Coupled Flow And Geomechanics

If you ally craving such a

referred **discrete fracture model for coupled flow and geomechanics** ebook that will come up with the money for you worth, acquire the utterly best seller from us currently from several preferred authors. If you want to comical books, lots of novels, tale, jokes, and more fictions collections are plus launched, from best seller to one of the most current released.

You may not be perplexed to

enjoy all ebook collections discrete fracture model for coupled flow and geomechanics that we will certainly offer. It is not approaching the costs. It's more or less what you craving currently. This discrete fracture model for coupled flow and geomechanics, as one of the most full of zip sellers here will very be among the best options to review.

~~EAGE E-lecture: Simulating~~

~~Correlated Discrete Fracture Networks, by François Bonneau~~ Discrete fracture network Discrete Element Methods ~~Mehl: Partitioning and Coupling of Multi-Physics PDE Simulations~~ *Webinar #8 - Fractured*

Reservoir Characterization and Modeling with FracaFlow *Peter Cundall - The Art of Numerical Modeling in Geomechanics* *Stochastic Modelling of Fractures in Rock Masses* ~~EAGE E-Lecture: Geological Well Testing in~~

~~Fractured Reservoirs by Patrick Corbett~~ *Stochastic Modeling of Karst Aquifers Webinar* ~~Numerical Simulation of Fractured Reservoirs~~ ~~Discrete Element Modelling of Masonry Structures~~ ~~The Importance of Natural~~

Fracture Type in Controlling Reservoir Permeability

Future Challenges of Modeling THMC Systems

Hydraulic Fracturing Stimulation **How an Aquifer Works** *EAGE E-Lecture: Seismic Geomechanics by Jörg*

Herwanger Basic fracture mechanics Lindsay Adler - Fashion Shoot Workflow From Start to Finish

1.7 Modeling and simulation of dynamical systems (AE3B35MSD): Deficiency of fixed-causality models~~What~~

~~is DEM?~~ **Seismic Facies Classification Scenarios From Waveform to Rock Type** ~~How to Create a Hydraulic Fracture~~ **Fluid Flow through Jointed Rock** ~~Fracture perm modeling/calibration calculator~~ ~~DETERMINE~~

~~PERMEABILITY IN NATURALLY FRACTURE RESERVOIR~~ ~~Brian Wirth | Degradation in Harsh Nuclear Environments~~ ~~L0430 Hydraulic fracture design and modeling: introduction~~ **dfnWorks** 3DEC 5.20 Introductory Webinar

Introduction to DIANA10

Discrete Fracture Model For Coupled

The Discrete Fracture Model (DFM) has been widely used to model the flow and transport in natural geological porous formations. Here, we extend the DFM approach to model deformation. The flow equations are discretized using a finite-volume method, and the poroelasticity equations are discretized using a Galerkin finite-element approximation.

Discrete fracture model for coupled flow and geomechanics ...

Discrete Fracture Model For Coupled Flow And

Geomechanics Author: crafty. roundhouse-designs.com-2020-10-14T00:00:00+00:01 Subject: Discrete Fracture Model For Coupled Flow And Geomechanics Keywords: discrete, fracture, model, for, coupled, flow, and, geomechanics Created Date: 10/14/2020 2:02:37 PM

Discrete Fracture Model For Coupled Flow And Geomechanics

An efficient discrete-fracture model is used to explicitly model the fractured system. Flexible unstructured gridding is employed to model arbitrarily-oriented fractures. The interrelations among pore volume, permeability and geomechanical conditions are considered dynamically using two-way coupled flow and geomechanics computations.

Sequentially coupled flow and geomechanical simulation ...

extensively. To represent the fracture deformation explicitly, the discrete fracture model has been more widely used recently in coupled fluid flow and geomechanics problems. A fracture is defined as two surfaces in contact in the dis-crete fracture model presented by Garipov et al,18 in which a mechanical model for the fractures is derived to describe the changes in the stress and the displacement fields through the surfaces representing the fractures.

A coupled compressible flow and geomechanics model for ...

Discrete Fracture Model For Coupled Flow And

Geomechanics collections to check out. We additionally have enough money variant types and furthermore type of the books to browse. The customary book, fiction, history, novel, scientific research, as capably as various new sorts of books are readily understandable here. As this discrete fracture ...

Discrete Fracture Model For Coupled Flow And Geomechanics

The ?rst hybrid model couples an embedded-discrete-fracture model (EDFM) with multiple interacting continua (MINC) into EDFM/MINC, which simulates the fracture network characterized by...

(PDF) Hybrid Coupled Discrete Fracture-Matrix and ...

A continuum model for coupled stress and ?uid ?ow in discrete fracture networks Quan Gan . Derek

Elsworth Received: 23 September 2015/Accepted: 9 December 2015/Published online: 5 January 2016
Abstract We present a model

coupling stress and

A continuum model for coupled stress and fluid flow in ...

In this work we consider a discrete fracture–matrix (DFM) model, where the fractures are modeled as lower dimensional interfaces embedded in the rock matrix. We assume Darcy flow both in the matrix and the fracture, and we only consider the case where the permeability in the fractures are orders of magnitude larger than in the matrix.

A simple embedded discrete fracture–matrix model for a ...

In this paper, a numerical model is developed for coupled analysis of deforming fractured porous media with multiscale fractures. In this model, the macro-fractures are modeled explicitly by the embedded discrete fracture model, and the supporting effects of fluid and fillings in these fractures are represented explicitly in the geomechanics model. On the other hand, matrix and micro-fractures are modeled by a multi-porosity model, which aims to accurately describe the transient matrix ...

An efficient hydro-mechanical model for coupled multi ...

A “discrete fracture network” (DFN) refers to a computational model that explicitly represents the geometrical properties of each individual fracture (e.g. orientation, size, position, shape and aperture), and the topological relationships between individual fractures and fracture sets.

The use of discrete fracture networks for modelling ...

Discrete Fracture Model For Coupled The Discrete Fracture Model (DFM) has been widely used to model the flow and transport in natural geological porous formations. Here, we extend the DFM approach to model deformation. The flow equations are

Discrete Fracture Model For Coupled Flow And Geomechanics

DOE PAGES Journal Article: A continuum model for coupled stress and fluid flow in discrete fracture networks. A continuum model for coupled stress and fluid flow in discrete fracture networks. Full Record; References (26) Other Related Research; Authors: Gan, Quan; Elsworth, Derek

A continuum model for

coupled stress and fluid flow in ...

The sub-model is coupled to the discrete fracture sub-model through the fracture surface. The domain size of the sub-model is such that the dominant, time-variable, dynamic transport processes during the expected years of reservoir exploitation are captured within this geometry.

A New T-H-M-C Model Development for Discrete-

Fracture EGS ...
In this study, we developed a new numerical manifold method model for analysis of fully coupled hydro-mechanical processes in porous rock with discrete fractures. In this model the

porous rock and the fractures are both deformable and fluid conductive with large contrast of mechanical and hydraulic properties.

A numerical manifold method

model for analyzing fully ...

The discrete fracture networks (DFNs) is quantitatively constructed according to the fracture density and stimulated reservoir area (SRA). This model is used to analyze the temporal/spatial evolution of the gas pressure and the net desorption rate.

Quantitative study in shale gas behaviors using a coupled ...

Discrete Fracture Model For Coupled Flow And Geomechanics Thank you enormously much for downloading discrete fracture model for coupled flow and geomechanics.Most likely you have knowledge that, people have look numerous time for their favorite books in imitation of this discrete fracture model for coupled flow and geomechanics, but end

Discrete Fracture Model For

Coupled Flow And Geomechanics
A model based on the code CrunchClay is presented for a fracture-clay matrix system that takes electrostatic effects on transport into account. The

electrostatic effects on transport include those associated with the development of a diffusion potential as captured by the Nernst-Planck equation, and the formation of a diffuse layer bordering negatively charged clay particles within which ...

link.springer.com
The discrete fractures were idealised as lower-dimensional geometric objects with the discrete

fracture elements located on the edges of continuum elements sharing the same nodes. The coupling between the two flow systems was achieved by using the principle of superposition.

British Library EThOS: Modelling of gas transport in coal ...

Transient transfer shape factor between matrix and fracture should be considered. Considering the transient transfer, a simulation workflow is developed using Discrete-Fracture and Continuum Models, i.e., embedded-discrete-fracture model (EDFM) and dual porosity (DP) model. We consider the SRV region and USRV region respectively.

Discrete Fracture Network Modeling of Hydraulic Stimulation describes the development and testing of a model that couples fluid-flow, deformation, friction weakening, and permeability evolution in large, complex two-dimensional discrete fracture networks. The model can be used to explore the behavior of hydraulic stimulation in settings where matrix permeability is low and preexisting fractures play an important role, such as Enhanced Geothermal Systems and gas shale. Used also to describe pure shear stimulation, mixed-mechanism stimulation, or pure opening-mode stimulation. A variety of novel techniques to ensure efficiency and realistic model behavior are implemented, and tested. The simulation methodology can also be used as an efficient method for directly solving quasistatic fracture contact problems. Results show how stresses induced by fracture deformation during stimulation directly impact the mechanism of propagation and the resulting fracture network.

Naturally fractured reservoirs (NFRs) hold a significant amount of the world's hydrocarbon reserves. Compared to conventional reservoirs, NFRs exhibit a higher degree of heterogeneity and complexity created by fractures. The importance of fractures in production of oil and gas is not limited to naturally fractured reservoirs. The economic exploitation of unconventional reservoirs, which is increasingly a major source of short- and long-term energy in the United States, hinges in part on effective stimulation of low-permeability rock through multi-stage hydraulic fracturing of horizontal wells. Accurate modeling and simulation of fractured media is still challenging owing to permeability anisotropies and contrasts. Non-physical abstractions inherent in conventional dual porosity and dual permeability models make these methods inadequate for solving different fluid-flow problems in fractured reservoirs. Also, recent approaches for discrete fracture modeling may require large computational times and hence the oil industry has not widely used such approaches, even though they give more accurate representations of fractured reservoirs than dual continuum models. We developed an embedded discrete fracture model (EDFM) for an in-house fully-implicit compositional reservoir simulator. EDFM borrows the dual-medium concept from conventional dual continuum models and also incorporates the effect of each fracture explicitly. In contrast to dual continuum models, fractures have arbitrary orientations and can be oblique or vertical, honoring the complexity and heterogeneity of a typical fractured reservoir. EDFM employs a structured grid to remediate challenges associated with unstructured gridding required for other discrete fracture models. Also, the EDFM approach can be easily incorporated in existing finite difference reservoir simulators. The accuracy of the EDFM approach was confirmed by comparing the results with analytical solutions and fine-grid, explicit-fracture simulations. Comparison of our results using the EDFM approach with fine-grid simulations showed that accurate results can be achieved using moderate grid refinements. This was further verified in a mesh sensitivity study that the EDFM approach with moderate grid refinement can obtain a converged solution. Hence, EDFM offers a computationally-efficient approach for simulating fluid flow in NFRs. Furthermore, several case studies presented in this study demonstrate the applicability, robustness, and efficiency of the EDFM approach for modeling fluid flow in fractured porous media. Another advantage of EDFM is its extensibility for various applications by incorporating different physics in the model. In order to examine the effect of pressure-dependent fracture properties on production, we incorporated the dynamic behavior of fractures into EDFM by employing empirical fracture deformation models. Our simulations showed that fracture deformation, caused by effective stress changes, substantially affects pressure depletion and hydrocarbon recovery. Based on the examples presented in this study, implementation of fracture geomechanical effects in EDFM did not degrade the computational performance of EDFM. Many unconventional reservoirs comprise well-developed natural fracture networks with multiple orientations and complex hydraulic fracture patterns suggested by microseismic data. We developed a coupled dual continuum and discrete fracture model to efficiently simulate production from these reservoirs. Large-scale hydraulic fractures were modeled explicitly using the EDFM approach and numerous small-scale natural fractures were modeled using a dual continuum approach. The transport parameters for dual continuum modeling of numerous natural fractures were derived by upscaling the EDFM equations. Comparison of the results using the coupled model with that of using the EDFM approach to represent all natural and hydraulic fractures explicitly showed that reasonably accurate results can be obtained at much lower computational cost by using the coupled approach with moderate grid refinements.

The development of naturally fractured reservoirs, especially shale gas and tight oil reservoirs, exploded in recent years due to advanced drilling and fracturing techniques. However, complex fracture geometries such as irregular fracture networks and non-planar fractures are often generated, especially in the presence of natural fractures. Accurate modelling of production from reservoirs with such geometries is challenging. Therefore, Embedded Discrete Fracture Modeling and Application in Reservoir Simulation demonstrates how production from reservoirs with complex fracture geometries can be modelled efficiently and effectively. This volume presents a conventional numerical model to handle simple and complex fractures using local grid refinement (LGR) and unstructured gridding. Moreover, it introduces an

Embedded Discrete Fracture Model (EDFM) to efficiently deal with complex fractures by dividing the fractures into segments using matrix cell boundaries and creating non-neighboring connections (NNCs). A basic EDFM approach using Cartesian grids and advanced EDFM approach using Corner point and unstructured grids will be covered. Embedded Discrete Fracture Modeling and Application in Reservoir Simulation is an essential reference for anyone interested in performing reservoir simulation of conventional and unconventional fractured reservoirs. Highlights the current state-of-the-art in reservoir simulation of unconventional reservoirs Offers understanding of the impacts of key reservoir properties and complex fractures on well performance Provides case studies to show how to use the EDFM method for different needs

Hydraulic Fracture Modeling delivers all the pertinent technology and solutions in one product to become the go-to source for petroleum and reservoir engineers.

Providing tools and approaches, this multi-contributed reference presents current and upcoming developments for modeling rock fracturing including their limitations and problem-solving applications. Fractures are common in oil and gas reservoir formations, and with the ongoing increase in development of unconventional reservoirs, more petroleum engineers today need to know the latest technology surrounding hydraulic fracturing technology such as fracture rock modeling. There is tremendous research in the area but not all located in one place. Covering two types of modeling technologies, various effective fracturing approaches and model applications for fracturing, the book equips today's petroleum engineer with an all-inclusive product to characterize and optimize today's more complex reservoirs. Offers understanding of the details surrounding fracturing and fracture modeling technology, including theories and quantitative methods Provides academic and practical perspective from multiple contributors at the forefront of hydraulic fracturing and rock mechanics Provides today’s petroleum engineer with model validation tools backed by real-world case studies

Discrete Fracture Network Modeling of Hydraulic Stimulation describes the development and testing of a model that couples fluid-flow, deformation, friction weakening, and permeability evolution in large, complex two-dimensional discrete fracture networks. The model can be used to explore the behavior of hydraulic stimulation in settings where matrix permeability is low and preexisting fractures play an important role, such as Enhanced Geothermal Systems and gas shale. Used also to describe pure shear stimulation, mixed-mechanism stimulation, or pure opening-mode stimulation. A variety of novel techniques to ensure efficiency and realistic model behavior are implemented, and tested. The simulation methodology can also be used as an efficient method for directly solving quasistatic fracture contact problems. Results show how stresses induced by fracture deformation during stimulation directly impact the mechanism of propagation and the resulting fracture network.

This book solves the open problems in fluid flow modeling through the fractured vuggy carbonate reservoirs. Fractured vuggy carbonate reservoirs usually have complex pore structures, which contain not only matrix and fractures but also the vugs and cavities. Since the vugs and cavities are irregular in shape and vary in diameter from millimeters to meters, modeling fluid flow through fractured vuggy porous media is still a challenge. The existing modeling theory and methods are not suitable for such reservoir. It starts from the concept of discrete fracture and fracture-vug networks model, and then develops the corresponding mathematical models and numerical methods, including discrete fracture model, discrete fracture-vug model, hybrid model and multiscale models. Based on these discrete porous media models, some equivalent medium models and methods are also discussed. All the modeling and methods shared in this book offer the key recent solutions into this area.

The 91st London Mathematical Society Durham Symposium took place from July 5th to 15th 2010, with more than 100 international participants attending. The Symposium focused on

Numerical Analysis of Multiscale Problems and this book contains 10 invited articles from some of the meeting's key speakers, covering a range of topics of contemporary interest in this area. Articles cover the analysis of forward and inverse PDE problems in heterogeneous media, high-frequency wave propagation, atomistic-continuum modeling and high-dimensional problems arising in modeling uncertainty. Novel upscaling and preconditioning techniques, as well as applications to turbulent multi-phase flow, and to problems of current interest in materials science are all addressed. As such this book presents the current state-of-the-art in the numerical analysis of multiscale problems and will be of interest to both practitioners and mathematicians working in those fields.

Multiphase Fluid Flow in Porous and Fractured Reservoirs discusses the process of modeling fluid flow in petroleum and natural gas reservoirs, a practice that has become increasingly complex thanks to multiple fractures in horizontal drilling and the discovery of more unconventional reservoirs and resources. The book updates the reservoir engineer of today with the latest developments in reservoir simulation by combining a powerhouse of theory, analytical, and numerical methods to create stronger verification and validation modeling methods, ultimately improving recovery in stagnant and complex reservoirs. Going beyond the standard topics in past literature, coverage includes well treatment, Non-Newtonian fluids and rheological models, multiphase fluid coupled with geomechanics in reservoirs, and modeling applications for unconventional petroleum resources. The book equips today’s reservoir engineer and modeler with the most relevant tools and knowledge to establish and solidify stronger oil and gas recovery. Delivers updates on recent developments in reservoir simulation such as modeling approaches for multiphase flow simulation of fractured media and unconventional reservoirs

Explains analytical solutions and approaches as well as applications to modeling verification for today’s reservoir problems, such as evaluating saturation and pressure profiles and recovery factors or displacement efficiency Utilize practical codes and programs featured from online companion website

This dissertation intends to advance fundamental understanding of two areas of interest in the petroleum industry: complex stimulated fracture network during hydraulic fracturing treatments and induced seismicity during wastewater disposal operations.

Successful completion of hydraulic fractures in unconventional formations has been the primary source of increased oil and gas production in the US. However, field observations suggest that the hydraulic fracture networks are much more complex and different from the classical description of bi-wing planar fractures. Thus, the attempts to optimize this stimulation technique are hindered by the uncertainties in predicting the complex fracture network. A by-product of massive improvement in oil and gas production is a significant amount of water being co-produced from these formations. The common practice in the industry is to recycle wastewater for hydraulic fracturing purposes or reinject it into the reservoir through disposal wells. In certain regions of the US, this wastewater injection has led to historically high seismicity rates and earthquakes of Magnitude 5 and above which caused the public to be concerned. To maintain the social license to continue such operations, these concerns need to be addressed, and the physics behind such induced events need to be understood. Two novel hydraulic fracturing and induced seismicity simulators are developed that implicitly couple fluid flow with the stresses induced by fracture deformation in large, complex, three-dimensional discrete fracture networks. The simulators can describe the propagation of hydraulic fractures and opening and shear stimulation of natural fractures. Fracture elements can open or slide, depending on their stress state, fluid pressure, and mechanical properties. Fracture sliding occurs in the direction of maximum resolved shear stress. Nonlinear empirical relations are used to relate normal stress, fracture opening, and fracture sliding to fracture aperture and transmissivity. Field-scale hydraulic fracturing simulations were performed in a dense naturally fractured formation. Height containment of propagating hydraulic fractures between bedding layers is modeled with a vertically heterogeneous stress field or by explicitly imposing hydraulic fracture height containment as a model assumption. The propagating hydraulic fractures can cross natural fractures or terminate against them depending on the natural fracture orientation and stress anisotropy. The simulations demonstrate how interaction with natural fractures in the formation can help explain the high net pressures, relatively short hydraulic fracture lengths, and broad regions of microseismicity that are often observed in the field during stimulation in low permeability formations, some of which were not predicted by classical hydraulic fracturing models. Depending on input parameters, our simulations predicted a variety of stimulation behaviors, from long hydraulic fractures with minimal leakoff into surrounding fractures to broad regions of dense fracturing with a branching network of many natural and

newly formed fractures.
Induced seismicity simulator was developed to investigate the effects of multiple operational, hydraulic, and geophysical parameters on the magnitude of induced earthquakes. The rate-and-

state framework is implemented to include the effect of fault nonlinear friction evolution and to model unstable earthquake rupture. The Embedded Discrete Fracture Model (EDFM) technique is used to model the fluid flow between the matrix and fractures efficiently. The results show that high-rate injections are more likely to induce a more significant earthquake, confirming the statistical correlation attributing induced events to high-rate injection wells. To understand the seismic occurrence outside of the injection zone, the effect of fault permeability structure on seismicity is studied by assigning nonuniform permeabilities as an input parameter. The model shows that the fault rupture is dominantly controlled by initial pressure and stress heterogeneity which ultimately affect the magnitude of an induced earthquake event

This monograph on fractures, fracture networks, and fractured porous media provides a systematic treatment of their geometrical and transport properties for students and professionals in Geophysics, Materials Science, and Earth Sciences.