

1. A study on viscoelastic damage model of compact bone

Zhang, R. (1); Wu, W. (1)

Source: *Chinese Journal of Biomedical Engineering*, v 18, n 2, p 194-198+221, Jun 1999; **Language:** Chinese; **ISSN:** 02588021; **Publisher:** Chinese Academy of Medical Sciences

Author affiliation: (1) Xian petroleum Institute, Xian 710065, China

Abstract: A damage model of compact bone with Haversian structure was proposed. The model was developed within the general framework of the CDM (continuum damage mechanics) through consideration of the irreversible changes of the mesostructure and the viscoelastic properties of bone. The correctness of this model was verified through the tensile tests of human wet compact bone specimens and the observations of the fracture surfaces of the specimens by scanning electron microscope. (9 refs)

Main heading: Bone

Controlled terms: Failure (mechanical) - Mathematical models - Strength of materials - Viscoelasticity

Uncontrolled terms: Bone viscoelastic damage - Compact bone damage model

Classification Code: 421 Strength of Building Materials; Mechanical Properties - 461.2 Biological Materials and Tissue Engineering - 931.2 Physical Properties of Gases, Liquids and Solids

Treatment: Applications (APP) - Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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2. Characteristics and tectonic setting of early cretaceous volcanic rocks, Yingen basin

Wu, Shaobo ; Bai, Yubao ; Yang, Youyun

Source: *Kuangwu Yanshi/Journal of Mineralogy and Petrology*, v 19, n 1, p 24-28, 1999; **Language:** Chinese; **ISSN:** 10016872

Abstract: According to fossil assemblage and stratigraphical contact relation, it is considered that the volcanic rocks of Suhongtu Formation in Yingen basin was formed in middle-late stage of Early Cretaceous. Their petrochemistry is characterized by containing high SiO₂ and Na₂O+K₂O, low MgO, 2O/K₂O ratio and oxidizing degree (Fe₂O₃/FeO) = 0.82-23.74. So it belongs to shoshonite series and is different from common alkaline basalts series. The rock types include trachybasalt, basaltic trachyandesite and trachyandesite. Their characteristics of petrochemistry and rock series indicate that the volcanic rock was formed in intra-continental orogenic belt.

Database: Compendex

Data Provider: Engineering Village

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3. Fractal simulation of fluid displacement in fractured reservoirs

Liu, Zhenhua

Source: *Shiyou Kan Tan Yu Kai Fa/Petroleum Exploration and Development*, v 26, n 6, p 47-50, Dec 1999;

Language: Chinese; **ISSN:** 10000747; **Publisher:** Sci Publ House

Database: Compendex

Data Provider: Engineering Village

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4. Study on the application of hybrid grid system in low-permeability reservoir simulation

Wang, Jingrong ; Li, Yun

Source: *Shiyou Kan Tan Yu Kai Fa/Petroleum Exploration and Development*, v 26, n 6, p 51-53, 59, Dec 1999;

Language: Chinese; **ISSN:** 10000747; **Publisher:** Sci Publ House

Database: Compendex

Data Provider: Engineering Village

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5. Design of the dynamic measurement and control software for V40 system II STD

Meng, Kaiyuan (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 2, p 22-26, Mar 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: V40 system II STD bus is universal microcomputer standard bus for industrial control. It represents the latest tendency of STD bus development. And it is widely applied due to its reasonable definition, easy interface, small size, low power, high noise resistance and direct forward compatibility. The measurement, control and management of the loading and unloading of 13 oil ways in a lubrication system were realized in 384 kilobytes virtual ROM of the STD V40 system II. The software can give both graph and text. It has good function and low price, and it is reliable. (7 refs)

Main heading: Computer software

Controlled terms: Computer control - Control equipment - Design - Oil tanks

Uncontrolled terms: Oil tank dynamic monitoring - Software design

Classification Code: 619.2 Tanks - 723.1 Computer Programming - 731.5 Robotics

Treatment: Applications (APP) - Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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6. Comparison of numerical simulation results of water flooding with gas injection in low-permeability reservoirs

Li, Liuren (1); Zhao, Yanyan (1)

Source: *Acta Mechanica Sinica/Lixue Xuebao*, v 15, n 2, p 10-12, May 1999; **Language:** Chinese; **ISSN:** 05677718

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: Taking the low-permeability reservoir of Pingqiao Area in Ansai Oil Field as an example, the results of water flooding and gas injection are numerically simulated with 3D 3P Full-compositional simulator, and the simulation results are compared. It is shown that, (1) the results of both water flooding and gas injection are better than those of natural development; (2) the processes of water flooding and gas injection can be divided into three stages according to the simulation results, in the first and last stages, the result of water flooding is better than that of gas injection, but in the middle stage, gas injection is better than water flooding; the start times and the durations of the three stages depend on the composition of injected gas; (3) the recovery factor of water flooding can reach 26.24%, the recovery factor of gas injection is in the range of 1.411%-24.28%, and the richer the injected gas, the higher the recovery factor; (4) the key to increasing recovery factor is to delay the breakthrough of injected gas at the bottom of producing well. (3 refs)

Main heading: Oil fields

Controlled terms: Computer simulation - Mechanical permeability - Oil well flooding - Oil well production

Uncontrolled terms: Gas injection - Low permeability oil field - Recovery factor - Water flooding

Classification Code: 511.1 Oil Field Production Operations - 512.1.1 Oil Fields - 723.5 Computer Applications

Treatment: Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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7. Application of low frequency pulse oil producing

Lu, Helong (1); Ren, Yuqi (1); Yang, Jianjiang (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 4, p 30-32, Jul 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: The development and present situation of low frequency pulse oil producing is introduced. The principle, technical parameters, key points and applicable condition of the technique are analyzed. the results of field tests show that the success ratio of the technique is 100%, the effectiveness ratio of it is 85%, and it can increase the crude output of single well by 35%. An Oil reservoir can be treated layer by layer by applying this technique, and the treatment does not produce secondary pollution of the oil reservoir. Operating equipment is mounted on a truck, operating is simple. Operating cost and operators' labour intensity all are low. The stimulation result of the technique is remarkable. (2 refs)

Main heading: Oil well production

Controlled terms: Oil wells - Pulse circuits - Pulse modulation - Well equipment

Uncontrolled terms: Low frequency pulse oil drilling - Separate layer treating

Classification Code: 511.1 Oil Field Production Operations - 713.4 Pulse Circuits - 716.1 Information Theory and Signal Processing

Treatment: Applications (APP) - Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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8. Longitudinal distribution and evolution law of the clay mineral in Shengbei structure

Ma, Li (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 2, p 10-12, 21, Mar 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: For studying the relationship between the distribution of clay mineral and borehole stability in Shengbei structure, taking TC2 well as an example, the authors systematically analysed the longitudinal distribution and the evolution of kaolinite (K), chlorite (C), illite(I), smectite (S) and illite/smectite mixed layer (I/S) in mud shale formation of the structure, and measured the cation exchange capacity (CEC) of K⁺, Na⁺, Ca²⁺, Mg²⁺ in the clay mineral. It is shown that in top formation is active mud shale, the content of S in it is about 40%; in middle it is hard, brittle and shatter (HBS) long mud shale, I/S is about 50%; in bottom formation, I/S decreases gradually and disappears. K, C and I are well-distributed in longitudinal direction, and they are not correlative to the rate of hole enlargement (RHE). RHE has a positive correlativity with I/S content in clay, but it has a negative correlativity with the S content of I/S. I in clay is more than 50%. The fractures and cleavages in I are developed. So it is held that the failure of borehold stabilization is due to the formation cracking and slabbing caused by some engineering factors when HBS mud shale contained more I and I/S releases tectonic stress. This type of hole collapse has obvious time-sensitivity. The main measures for inhibiting well sloughing must be plugging fractures instead of increasing K⁺ concentration in drilling fluids because CEC especially EK in clay mineral is very small in Shengbei structure. (4 refs)

Main heading: Petroleum geology

Controlled terms: Clay minerals - Distribution of goods - Drilling fluids - Stabilization - Structural geology

Uncontrolled terms: Clay mineral distribution - Oil field structure

Classification Code: 481.1 Geology - 482.2 Minerals - 512.1 Petroleum Deposits

Treatment: Applications (APP) - Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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9. Fracture character and collapse mechanism of the hard brittle mud shale in Shengbei structure

Ma, Li (1); Ni, Wenxue (1); Ding, Fenghu (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 4, p 26-29, Jul 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: In order to seek the sloughing prevention measures for the mud shale in Shengbei structure, the fracture character and the collapse mechanism of the mud shale are analyzed. The analysis shows that the mud shale can be classified into middle-weak swelling and dispersion mud shale, its formation rock is hard and brittle, and there are developed fissure and microfracture in it. Cyclic collapse will take place when the mud shale is soaked in the filter liquor of drilling fluid for a long time under the joint effects of the structural stress produced by range-front tectonic movement, the expansion force produced by montmorillonite in the process of diagenism and dehydration, and coal interbeds with different thickness. The wellbore collapse of this type formation can be prevented by increasing drilling fluid inhibition, improving the quality of drilling fluid filter cake and plugging formation micro-fracture. (8 refs)

Main heading: Petroleum geology

Controlled terms: Brittleness - Drilling fluids - Oil wells - Stability - Structural geology

Uncontrolled terms: Mud shale - Well hole stability

Classification Code: 421 Strength of Building Materials; Mechanical Properties - 481.1 Geology - 512.1 Petroleum Deposits

Treatment: Applications (APP) - Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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10. Factors influencing the rate of penetration (ROP) of hammer drilling

Guo, Jianqiang (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 5, p 10-11, 23, Sep 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: The relationship between ROP and pump flowrate, standpipe pressure, hammer frequency and the resonance of drilling string and fluid column was analyzed. It shows that the rate of penetration (ROP) increases

quickly with the increase of hammer frequency, but the relationship is non linear. There is an optimum range of hammer frequency in which ROP can keep a high level. The resonance will greatly influence system amplitude, and it will also fluctuate ROP. The hammer frequency of the drilling system in which mud is used as drilling fluid is lower than that of the drilling system in which water is used as drilling fluid. The physical properties of mud (viscosity, density and elasticity) have effect on hammer frequency. Research shows that the ROP of hammer drilling is higher than that of other conventional drilling methods although there are some unfavourable factors. (3 refs)

Main heading: Oil well drilling

Controlled terms: Drilling fluids - Mud pumps - Resonance

Uncontrolled terms: Hammer drilling - Hammer frequency - Penetration

Classification Code: 511.2 Oil Field Equipment - 512.1.2 Petroleum Deposits : Development Operations - 931.1 Mechanics

Treatment: Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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11. Study on the measuring method of power angle δ in an electric system

Yan, Suli (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 3, p 30-33, 41, May 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: There is a relationship between power angle δ and the states of an electric power system. δ is an important parameter for judging the stability of electric power systems. Therefore, it is necessary to measure, monitoring and record δ . In both steady and transient states, the measurement of δ has great significance. But up to now, there has not been a simple real-time measuring method of δ . Usually, it is indirectly gained by remotely measuring other parameter two direct measuring methods, are put forward and measuring accuracy and error are analysed. (6 refs)

Main heading: Electric power systems

Controlled terms: Angle measurement - Error analysis - Stability - Waveform analysis

Uncontrolled terms: Power angle measuring - Power system states

Classification Code: 701.1 Electricity: Basic Concepts and Phenomena - 706.1 Electric Power Systems - 921.6 Numerical Methods

Treatment: Applications (APP) - Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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12. Review on the development of drilling fluid additives from vegetable phenols

Zhang, Jie (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 2, p 35-37, 49, Mar 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: Vegetable phenol compounds are renewable natural phenolic materials. Lignin and Tannin of them have been used as drilling fluid additives. Their modified products have been developed such as aqueous alkali of vegetable phenols, sulfonated vegetable phenols, complexed vegetable phenols with metal, oxidated vegetable phenols, condensed vegetable phenols, grafting copolymers of vegetable phenol with polymer, and so on. These products are mainly as the additive for dispersing drilling fluids. Their preparation methods and acting mechanisms in the drilling fluids are summarized. But now, there is a tendency to use non-dispersing polymer drilling fluids. The drilling fluid additives above from plant phenols will be eliminated because they can not be used for non-dispersing polymer drilling fluids. It is imperative to develop new vegetable phenol additives for non-dispersing polymer drilling fluids. For this purpose, thinners and filtration-control additives should be developed which can modify the inhibitory property of polymer drilling fluids. (25 refs)

Main heading: Drilling fluids

Controlled terms: Additives - Organic polymers - Phenols - Plants (botany)

Uncontrolled terms: Drilling fluid additives - Plant phenols

Classification Code: 511.2 Oil Field Equipment - 803 Chemical Agents and Basic Industrial Chemicals - 804.1 Organic Compounds

Treatment: Applications (APP) - Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village
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13. JYGJ-1 instrument for information transmission from surface to down-hole

Shang, Haiyan (1); Zhou, Jing (1); Fu, Xinsheng (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 1, p 30-32, Jan 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: The bi-directional information transmission between surface and down-hole is necessary to a well trajectory automatically-controlling system. Measuring while drilling (MWD) system is a good information transmission system from down-hole to surface. But till now, there has been no well-rounded one from surface to down-hole. In accordance with the demand, the overall scheme of the system is put forward, and hardware design and its realization are also discussed. The scheme of the system circuit is based on the fact that there is a great difference in the vibration around drilling bit when drilling and stopping. The circuits of vibration sensor, signal processing and system programming, and correlative software are designed. The results of simulation testing show that the design of the circuits and the selection of the apparatus parts are appropriate. (3 refs)

Main heading: Oil well drilling

Controlled terms: Computer circuits - Computer hardware - Computer software - Control systems - Information use

Uncontrolled terms: Automatic drilling equipment - Computerized logging system - Vibration energy

Classification Code: 511.1 Oil Field Production Operations - 721.3 Computer Circuits - 723.5 Computer Applications - 731.1 Control Systems

Treatment: Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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14. Quantitative relationships between formation pressure level and injection-production ratio and water cut

Luo, Chengjian (1); Xu, Huayi (1); Li, Liuren (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 4, p 33-34, Jul 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: Most of the oilfields in east China have been in middle or high water-cut stage. To maintain a stable oil production and control water-cut becomes a main task of oilfield engineers. Maintaining formation pressure level is a key to finishing the task. The quantitative relationships between injection-production ratio, formation pressure level and fluid yield and water-cut are obtained by material balance equation and water-drive characteristic curve, and they are applied in Ji-11 fault block of Bieguzhuang Oil Field. The research result is of importance in making water injection policy for high water-cut oilfields. (2 refs)

Main heading: Oil well production

Controlled terms: Injection (oil wells) - Oil field development - Petroleum geology - Pressure effects

Uncontrolled terms: Injection production ratio - Material balance equation

Classification Code: 481.1 Geology - 511.1 Oil Field Production Operations - 512.1 Petroleum Deposits

Treatment: Applications (APP) - Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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15. Calculation method of the force that wellhead equipment exerts on casing string

Zhou, Sanping (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 3, p 22-26, May 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: Some papers have been published on the calculation of the force. But in these papers, the factors affecting the force are not completely considered, and the calculated result is in the side of safety. The factors are analysed, and based on pole stability and strength theories, a formula for calculating the force is derived. In the derivation of the formula, the poem party of casing string is divided into tensed segment and compressed segment, and this makes

calculated result more practical. The calculation result of an example shows that the effect of downhole temperature change on the force is great, and that the effect of wellhead foundation setting is also not negligible. (9 refs)

Main heading: Oil well casings

Controlled terms: Oil well production - Stability - Stress analysis - Tensile stress

Uncontrolled terms: Casing string - Oil well head lift force

Classification Code: 408.1 Structural Design, General - 421 Strength of Building Materials; Mechanical Properties - 511.2 Oil Field Equipment

Treatment: Applications (APP) - Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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16. Scheme for oil-field production real-time monitoring

Meng, Kaiyuan (1); Xu, Shuifa (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 1, p 26-29, Jan 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: The exploration, drilling and production works in an oil field generally distribute in a large region, and a general headquarters is set up in the region. For easily managing, the whole oil field is often divided into a few small areas, and a forward command post is set up in each area. A remote oil field production real-time monitoring communication system is needed among general headquarters, forward command posts and drilling teams. A scheme of the communication net is put forward, including reasonable sub-net distribution, reliable communication channels and techniques, hierarchy tactics and excellent hardware disposition and software flow. At last, the realization of the scheme, the expansion and the reliability of the communication net are discussed. (3 refs)

Main heading: Oil well production

Controlled terms: Communication systems - Computer networks - Remote control

Uncontrolled terms: Drilling data - Real time monitoring system - Tactics

Classification Code: 511.1 Oil Field Production Operations - 723.5 Computer Applications - 732.1 Control Equipment

Treatment: Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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17. Prediction of oil and gas based on 3D seismic data by fuzzy BP neural network

Li, Jin (1); Sun, Yuan (1); Zhang, Chengli (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 6, p 17-19, Nov 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: A method was put forward for the prediction of oil and gas in the initial and medium stages of oil-field tract development. In the method, seismic attribute parameters are extracted from 3D seismic data, then based on the seismic attribute parameters, oil and gas forecasting is made by fuzzy BP neural network. The results of examples show that the method has high accuracy and reliability. In order to increase the convergence rate and reliability of the network, and to decrease its oscillation, two corrections of it-dynamic adjustment of learning rate and dynamic adjustment of weight factors, were proposed. (1 refs)

Main heading: Oil field development

Controlled terms: Data processing - Earthquake effects - Forecasting - Fuzzy sets - Neural networks - Three dimensional

Uncontrolled terms: Convergence rate - Dynamic adjustment - Seismic data processing

Classification Code: 484.1 Earthquake Measurements and Analysis - 512.1.2 Petroleum Deposits : Development Operations - 723.4 Artificial Intelligence - 921.4 Combinatorial Mathematics, Includes Graph Theory, Set Theory

Treatment: Applications (APP) - Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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18. Study of the overall criterion for judging the non-darcy flow through low permeability porous media

Ruan, Min (1); He, Qiuxuan (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 4, p 46-48, Jul 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: Judgement of the non-darcy flow through low permeability porous media is a new topic in the research of seepage flow mechanics. It is importance to the reasonable development of low permeability oil fields. The flow through the media deviates from linearity, and displays the non-darcy flow with pseudo-startup pressure gradient. A great number of experiments were made to determine the condition of displaying the flow. The main parameter causing the non-darcy flow, such as liquid viscosity, media permeability, pore geometry structure, etc are studied by dimensional analysis method, and an overall criterion-pressure number is #N put forward. When #N>5, the flow displays non-darcy flow; when #NN<5, it is the transitional flow between non-darcy flow and Darcy flow. (3 refs)

Main heading: Petroleum geology

Controlled terms: Mechanical permeability - Pressure effects - Structural geology - Viscosity measurement

Uncontrolled terms: Low permeability pools - Non darcy flow

Classification Code: 481.1 Geology - 512.1 Petroleum Deposits - 931.2 Physical Properties of Gases, Liquids and Solids

Treatment: Applications (APP) - Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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19. Decoding of the communication channel from down hole to surface in drilling well

Zhou, Jing (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 2, p 27-31, Mar 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: The bi-directional communication channel between down hole and surface is essential to down hole closed control system (DCLS). Measuring while Drilling (MWD) is a good channel from down hole to surface, and it has become a universal product in the world. But until now, there has not been a mature channel from surface to down hole. To meet the demand, a channel is put forward. In it, the vibration of drilling string is as an information carrier. The information is coded as 0 that drilling string has been resting for 60s, and 1 that the drilling string has been vibrating for 60s. The code of information source consists of synchronism codes and message codes. Decoding system is mounted on the drilling string about 2 m from bit. It consists of vibration sensor, decoding circuit and decoding software. The sensor distinguishes the rotation from the rest of the string, and then feeds the signal into the decoding circuit. The circuit has learning ability to some extent, and it finishes decoding with the decoding software. The selection of the circuit parameters and the flow chart of the decoding software are given in the paper. Finally, the equipment for simulation experiment is introduced. And the simulated results are given. (5 refs)

Main heading: Oil well drilling

Controlled terms: Communication systems - Decoding - Oil well logging

Uncontrolled terms: Down going communication - Logging tool

Classification Code: 512.1 Petroleum Deposits - 716.1 Information Theory and Signal Processing - 723.2 Data Processing and Image Processing

Treatment: Applications (APP) - Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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20. Effects of technical vibration on the relative permeability curve of a core

Ma, Jianguo (1); Liu, Xiaojuan (1); Du, Fuxiang (1); Ma, Dongxia (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 1, p 13-15, Jan 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: This paper introduces the measuring method of water displacement relative permeability curves of a core and the principle of data processing. Three sets of comparable relative permeability curves are given. By comparing the curves under mechanical vibration with the curves without mechanical vibration, it is known that under mechanical vibration, the relative permeability curves of water also move toward the left, and those of oil move toward the right; the relative permeability of oil and water can increase by 20%-30%, residual oil saturation can be reduced by a factor of 50/41, and breakthrough recovery and ultimate recovery can increase by 9% and 10% respectively. From the above

results, it is drawn that, suitable mechanical vibration can effectively enhance the effectiveness of water displacement, reduce the surface tension of water and oil and capillary pressure, thus speed the gravitational separation of oil and water, and reduce the water cut and the viscosity of produced oil. (5 refs)

Main heading: Petroleum reservoir engineering

Controlled terms: Core analysis - Mechanical permeability - Vibrations (mechanical) - Water

Uncontrolled terms: Recovery factor - Relative permeability curve

Classification Code: 512.1.2 Petroleum Deposits : Development Operations - 931.2 Physical Properties of Gases, Liquids and Solids

Treatment: Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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21. Application of artificial neural network in the description of the relationship between fluid withdrawal rate and injected water volume in water injection oilfields

Zheng, Xinxia (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 6, p 24-27, Nov 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: Fluid withdrawal rate is a continuous function of water injection parameters, formation parameters and other parameters in the water injection development period. For this reason, the description of individual-well attitude and the prediction of individual-well fluid withdrawal rate by artificial neural network were discussed. The injection-production system of a tract in certain oilfield is composed of 5 oil wells and 10 water injection wells. The artificial neural network model established in this paper was exercised by the injection-production data in 12 months. The result shows that the complicated functional relationship between fluid withdrawal rate and injected water volume can be quantitatively described by artificial neural network. The method can be used for the description of waterflooding attitude. The result of rolling prediction shows that the predicted accumulative oil production coincides with the measured result. (3 refs)

Main heading: Oil fields

Controlled terms: Artificial intelligence - Flow of fluids - Forecasting - Neural networks - Oil wells - Water injection

Uncontrolled terms: Fluid withdrawal rate - Oil recovery

Classification Code: 512.1.1 Oil Fields - 631.1 Fluid Flow, General - 723.4 Artificial Intelligence

Treatment: Applications (APP) - Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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22. Hydraulic system of coiled tubing injector

Gao, Jinian (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 2, p 38-40, 45, Mar 25 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: Coiled tubing operation can save a lot of on-off time and consumed energy. So it is widely applied. The core of a coiled tubing equipment is an injector. A hydraulic system is designed for the injector. The hydraulic system consists of main circuit and auxiliary circuit. The former meets the load requirement of the system, and the latter ensures the operation flexibility of it. The debugging and the maintenance of the system are very easy. Volume control and flow control are adopted at the same time in main circuit to meet the load requirements of positive and negative torques separately. This control way is specially suitable to large power systems. The constitution and the operating principle of the hydraulic system are introduced. Its characteristics are analysed. It is shown that the system can satisfy the load and operation requirements of the injector, and it is an ideal hydraulic system of coiled tubing injector. (2 refs)

Main heading: Injection (oil wells)

Controlled terms: Design - Hydraulic drives - Hydraulic machinery - Tubes (components)

Uncontrolled terms: Coiled tubing injector - Hydraulic transmission

Classification Code: 511.1 Oil Field Production Operations - 602.2 Mechanical Transmissions - 619.1 Pipe, Piping and Pipelines

Treatment: Applications (APP) - Theoretical (THR) - Experimental (EXP)

Database: Compendex

Data Provider: Engineering Village

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23. Design and realization of a distributed intelligent application software system for reservoir protection

Li, Qi (1)

Source: *Xi'an Shiyou Xueyuan Xuebao/Journal of Xi'an Petroleum Institute (Natural Science Edition)*, v 14, n 5, p 13-16, Sep 1999; **Language:** Chinese; **ISSN:** 10015361

Author affiliation: (1) Xi'an Petroleum Inst, Xi'an, China

Abstract: Based on distributed Client/Service computer system, a distributed intelligent application software system was designed for reservoir protection. It is composed of some personal computers (Client) a database (Server) and a knowledge base (Server) connected together by an ether network. Data management, knowledge management and the inference function of artificial intelligent language are integrated together, thus the different branches in an oil-gas field can make the identification, evaluation, diagnosis, precaution and treatment of formation damage under the same computer network environment. They can share computer resource, data and knowledge. The characteristics, platform structure, composition and realization of the system were introduced. (3 refs)

Main heading: Petroleum reservoirs

Controlled terms: Artificial intelligence - Computer software - Database systems - Knowledge based systems - Personal computers - Protection

Uncontrolled terms: Information system - Platform design

Classification Code: 512.1.1 Oil Fields - 722.4 Digital Computers and Systems - 723.4 Artificial Intelligence - 914.1 Accidents and Accident Prevention

Treatment: Applications (APP) - Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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24. Dynamic dual-laterolog responses: Model and field applications in the Bohai Gulf of China

Liu, Zhen-Hua (1); Oyang, Jian (2); Zhang, Jian-Hua (1)

Source: *Journal of Petroleum Science and Engineering*, v 23, n 1, p 1-11, May 1999; **ISSN:** 09204105; **DOI:** 10.1016/S0920-4105(98)00086-2; **Publisher:** Elsevier

Author affiliation: (1) Xian Petroleum Institute, Dept. of Mech. Engineering, 710065, Xi'an, China (2) Petrol. Explor. Bur. China Natl. P., Beijing 100724, China

Abstract: The process of mud filtrate invading into an oil/gas reservoir is complicated and time-dependent. Filtration causes dual-laterolog responses to deviate from the true-formation resistivity. The magnitude of deviation depends on the time when the well is logged. A model of dynamic dual-laterolog responses is suggested by considering the invasion time effect and is solved numerically. The model can give the variation of dual-laterolog readings with time. When saline-water mud filtrate invades a reservoir, dual-laterolog responses decrease with time. Laterolog response is affected by invasion time, saturation, permeability, porosity, and oil-viscosity. Generally, if a formation is invaded by saline filtrate for a week, the deep laterolog reading will be less by a factor of two or three than true formation resistivity. This decrease in measured resistivity influences not only the quantitative calculation of saturation, but also the determination of an oil/gas reservoir. Field application in the Bohai Gulf of China indicates that logging values deviate significantly from the true formation resistivity if the well is not logged repeatedly and quickly, so that the time effect ought to be taken into account. The present study suggests a reasonable method to determine true formation resistivity and to evaluate a reservoir for dynamic mud filtrate invasion by history matching field data. (10 refs)

Main heading: Petroleum reservoir evaluation

Controlled terms: Filtration - Mathematical models - Mud logging - Numerical analysis - Petroleum reservoir engineering - Porosity - Saturation (materials composition) - Viscosity

Uncontrolled terms: Dual-laterolog responses - True formation resistivity

Classification Code: 512.1.2 Petroleum Deposits : Development Operations - 801.4 Physical Chemistry - 802.3 Chemical Operations - 921 Mathematics - 921.6 Numerical Methods - 931.2 Physical Properties of Gases, Liquids and Solids

Treatment: Theoretical (THR)

Database: Compendex

Data Provider: Engineering Village

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25. Supercritical properties of a relaxation oscillator

Wu, Shun-Guang ; Ding, Xiao-Ling ; Ma, Ming-Quan ; Yin, Yue-Cai ; Nin, Jian-Jun ; Qu, Shi-Xian ; He, Da-Ren

Source: *Wuli Xuebao/Acta Physica Sinica*, v 48, n 12, p 2167-2168, December 1999; **Language:** Chinese; **ISSN:** 10003290; **Publisher:** Science Press

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Abstract: In this paper we present the analytic expressions of partition lines in the parametric space of a piece-wise smooth mapping describing an electronic relaxation oscillator. The supercritical regions with permission of period-doubling bifurcation, prohibition of period-doubling bifurcation, and complete phase-locking are discussed. Among them the region, where period-doubling bifurcation is prohibited but chaos is permitted is reported for the first time to our knowledge. These kinds of phenomena and regions can be observed in a lot of similar systems. (11 refs)

Database: Compendex

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