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Monitoring Ability; 1.5.2.5 Improvement in Data Processing Techniques; 1.5.3 Remote Sensing and Real-time Monitoring; 1.5.3.1 Monitoring Offshore Structures; 1.5.3.2 Development of a Dynamic Characterization Tool (Based on Seismic-while-drilling Data) 1.5.3.3 Use of 3-D Sonogram 1.5.3.4 Virtual Reality (VR) Applications; 1.5.3.5 Intelligent Reservoir Management; 1.6 Economic Models Based on Futuristic Energy Pricing Policies; 1.7 Integrated System of Monitoring, Environmental Impact and Economics; 2. Reservoir Simulator-input/output; 2.1 Input and Output Data; 2.2 Geological and Geophysical Modeling; 2.3 Reservoir Characterization; 2.3.1 Representative Elementary Volume, REV; 2.3.2 Fluid and Rock Properties; 2.3.2.1 Fluid Properties; 2.3.2.1.1 Crude Oil Properties; 2.3.2.1.2 Natural Gas Properties; 2.3.2.1.3 Water Content Properties 2.3.3 Rock Properties 2.4 Upscaling; 2.4.1 Power Law Averaging Method; 2.4.2 Pressure-solver Method; 2.4.3 Renormalization Technique; 2.4.4 Multiphase Flow Upscaling; 2.5 Pressure/Production data; 2.5.1 Phase Saturations Distribution; 2.6 Reservoir Simulator Output; 2.7 History-matching; 2.7.1 History-matching Formulation; 2.7.2 Uncertainty Analysis; 2.7.2.1 Measurement Uncertainty; 2.7.2.2 Upscaling Uncertainty; 2.7.2.3 Model Error; 2.7.2.4 The Prediction Uncertainty; 2.8 Real-time Monitoring; 3. Reservoir Simulators: Problems, Shortcomings, and Some Solution Techniques 3.1 Multiple Solutions in Natural Phenomena 3.1.1 Knowledge Dimension; 3.2 Adomian Decomposition; 3.2.1 Governing Equations; 3.2.2 Adomian Decomposition of Buckley-Leverett Equation; 3.2.3 Results and Discussions; 3.3 Some Remarks on Multiple Solutions; 4. Mathematical Formulation of Reservoir Simulation Problems; 4.1 Black Oil Model and Compositional Model; 4.2 General Purpose Compositional Model; 4.2.1 Basic Definitions; 4.2.2 Primary and Secondary Parameters and Model Variables; 4.2.3 Mass Conservation Equation; 4.2.4 Energy Balance Equation; 4.2.5 Volume Balance Equation 4.2.6 The Motion Equation in Porous Medium

Sommario/riassunto

Advanced Petroleum Reservoir Simulation Add precision and ease to the process of reservoir simulation. Until simulation software and other methods of reservoir characterization were developed, engineers had to drill numerous wells to find the best way to extract crude oil and natural gas. Today, even with highly sophisticated reservoir simulations software available, reservoir simulation still involves a great deal of guesswork. Advanced Petroleum Reservoir Simulation provides an advanced approach to petroleum reservoir simulation, taking the guesswork out of the process and re