Drilling

473–482
SPE-204238-PA (Direct to Peer)
Application of Nanosilica in Glycerol-Based Drilling Fluid for Shale Formations
C. Lyu, S. Hao, and L. Yang

483–493
SPE-204454-PA (Direct to Peer)
Measurement While Drilling Mud Pulse Signal Denoising and Extraction Approach Based on Particle-Swarm-Optimized Time-Varying Filtering Empirical Mode Decomposition
X. Zhong, L. Cen, Y. Zhao, T. Huang, and J. Shi

494–509
SPE-204466-PA (Direct to Peer)
Modeling Cuttings Transport without Drillpipe Rotation While Using the Concepts of Static and Dynamic Yield Stresses
S. Gulraiz and K. E. Gray

510–528
SPE-204468-PA (Direct to Peer)
Optimal Wellbore Placement of a Penta-Lateral Well in the Schrader Bluff Reservoir, North Slope, Alaska

529–541
SPE-204479-PA (Direct to Peer)
Horner Analysis for Negative Inflow Tests of Well Barriers
J. Peyton, J. Salamaga, A. McPhee, and A. Jongejan

542–551
SPE-205004-PA (Direct to Peer)
Experimental Investigation of Aloe-Vera-Based CuO Nanofluid as a Novel Additive in Improving the Rheological and Filtration Properties of Water-Based Drilling Fluid

552–559
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Significant Surge and Swab Offshore Brazil Induced by Rig Heave during Drillpipe Connections
J.-M. Godhavn, B. Olorunju, D. Gorski, M. Kvernland, M. Sant’Ana, O. M. Aamo, and S. Sangesland
Analysis of Torsional Stick-Slip Situations from Recorded Downhole Rotational Speed Measurements
E. Cayeux, A. Ambruš, L. Øy, A. Helleland, S. Brundtland, H. Nevøy, and M. Morys

Prediction of Reservoir-Kick Effect and Its Management in the Managed-Pressure-Drilling Operation
M. Musab Habib, S. Imtiaz, F. Khan, S. Ahmed, and J. Baker

Quantifying Global and Random Uncertainties in High Resolution Global Geomagnetic Field Models Used for Directional Drilling
C. D. Beggan, S. Macmillan, W. J. Brown, and S. J. Grindrod

Simulating Drillstring Dynamics Motion and Post-Buckling State with Advanced Transient Dynamics Model
W. Chen, Y. Shen, R. Chen, Z. Zhang, and S. A. Rawlins

Measurement of Mud Motor Back-Drive Dynamics, Associated Risks, and Benefits of Real-Time Detection and Mitigation Measures
J. Sugiura and S. Jones

Stress Analysis of Variable Ram Blowout Prevention Valves
A. Achuthan and S. Jayanath

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A Novel Experimental Method for Mudcake Removal Efficiency of Spacer
R. Zheng, Y. Li, J.-Z. Jin, and Z.-S. Liu

Experimental Evaluation of a New Nonaromatic Nonionic Surfactant for Deep Carbonate Stimulation
K. Sokhanvarian, C. Stanciu, J. M. Fernandez, A. F. Ibrahim, H. Kumar, and H. A. Nasr-EI-Din
Design for Reliability: Experimental and Numerical Simulation of Cased and Perforated Completions with Standalone Screen

Understanding Real-Time Job Signatures on Deepwater Cementing Jobs with Dynamic Losses
M. Dooply, M. Schupbach, K. Hampshire, J. Contreras, and N. Flamant

Pressure Decline Analysis in Fractured Horizontal Wells: Comparison between Diagnostic Fracture Injection Test, Flowback, and Main Stage Falloff
H. Wang, B. Elliott, and M. Sharma

Investigation of Dehydroxylated Sodium Bentonite as a Pozzolanic Extender in Oil-Well Cement
S. Adjei, S. Elkatatny, P. Sarmah, and G. Chinea

Thick-Wall Elastic Collapse for Casing Design
R. F. Mitchell
Editorial Notes

**Journal Impact Factors.** Clarivate Analytics released the 2021 Journal Citation Report (JCR) in June and once again it reflects a positive trend for SPE journals in the most recent impact factors: *SPE Journal* (3.478), *SPE Reservoir Evaluation & Engineering* (2.250), *SPE Production & Operations* (1.894), *SPE Drilling & Completion* (1.500). While it is important not to overly depend on impact factors for research assessment, the JCR has a reputation of excellence and integrity for its meticulous selection of top journals.

In Scopus, *SPE Drilling & Completion* ranked No. 219 out of 596 journals in Mechanical Engineering (placing it in the 63rd percentile for its subject area). In addition, the journal currently has a time to first decision of 30 days and a CiteScore of 3.2.

**Paper Length Limits.** Beginning 1 October 2021, all new submissions to SPE’s peer-reviewed journals must meet SPE’s paper length limit requirements. Under these requirements, technical papers should be no more than 10,000 words, including the abstract, main text, tables, figure captions, and appendices (but not including the title, affiliations, acknowledgments, nomenclature, or references). In addition, a maximum of 20 figures that are sized half-page or smaller (full-page figures will be counted as two figures) will be allowed.

Papers that exceed the length limit will be returned by SPE staff with a request to shorten the manuscript before the paper will be submitted for peer review. We encourage authors to run a word count check before submission to avoid processing delays, and we also encourage use of the Supplementary Materials template (available in Author Resources) for submission of additional data, figures, and tables that support the main paper. Supplements submitted with the paper for review will be later published with the accepted paper. Note that review papers do not have a length limit, and the length limit will not apply to revisions or resubmissions in progress as of the effective date.

**Special Issues.** SPE periodically publishes special issues of its journals that are devoted to topics of significant current interest in the upstream oil and gas industry. In the past, special issues replaced a regular issue of a journal, but the model has been updated to reflect real-time compilation. This means papers slated for a special issue will publish online as an article in press to be later paginated into a regular issue of the journal. At the same time, these papers will be compiled in the order of publication to OnePetro under their special issue topic. The first special issue under this new model—**2021 SPE Reservoir Simulation Conference Special Issue**—is in progress and accepted papers are available for viewing in *SPE Journal*. To learn more about the model and process, visit [OnePetro](https://www.onepetro.org).
Executive Summary

Drilling
In Application of Nanosilica in Glycerol-Based Drilling Fluid for Shale Formations, the authors develop a formula for glycerol-based drilling fluid that is suitable for shale formations with severe wellbore instability problems. Drilling fluids with varying combinations of nanosilica, glycerol, sodium carboxymethyl cellulose, and xanthan gum in organic soil glycerol-based slurry are tested, and the effects of nanosilica on the swelling of shale samples and the lubricity of drilling fluids are investigated to verify the feasibility of designed drilling fluids.

In Measurement While Drilling Mud Pulse Signal Denoising and Extraction Approach Based on Particle-Swarm-Optimized Time-Varying Filtering Empirical Mode Decomposition, the authors develop an algorithm for optimal denoising shaping based on particle-swarm-optimized time-varying filtering empirical mode decomposition. The simulation signal and drilling fluid pulse signal analysis results show that the proposed approach can extract the original pulse signal accurately.

The study discussed in Modeling Cuttings Transport without Drillpipe Rotation While Using the Concepts of Static and Dynamic Yield Stresses uses the concepts of static and dynamic yield stresses to investigate the effects of yield stress on cuttings transport. A modified form of an existing rheological function is proposed to model static and dynamic yield stresses while incorporating flow history. It is found that the fluid with a larger difference between static and dynamic yield stresses has better cuttings carrying capacity.

In Optimal Wellbore Placement of a Penta-Lateral Well in the Schrader Bluff Reservoir, North Slope, Alaska, the authors describe a novel approach in geosteering to maximize net sandstone exposure, using deep azimuthal resistivity and real-time user-guided multilayered inversion modeling.

In Horner Analysis for Negative Inflow Tests of Well Barriers, the authors reveal that Horner analysis of thermal expansion is a practice without theoretical justification. They propose a new method to interpret a trend of flowback when monitoring well barriers. The findings of this study can help improve understanding Horner analysis and techniques for interpreting inflow tests.

In Experimental Investigation of Aloe-Vera-Based CuO Nanofluid as a Novel Additive in Improving the Rheological and Filtration Properties of Water-Based Drilling Fluid, the authors investigate the application of natural aloe vera and CuO nanofluids combined as an additive in water-based drilling fluid to address drilling problems. This study aims to exploit the property of native aloe vera and CuO nanofluids combined to enhance the rheological and filtration properties of water-based drilling fluid by conducting the tests both before and after hot rolling conditions.

Surge and swab during drillpipe connections can result in a loss or an influx and should be considered in the well planning phase when mud weight, section lengths, etc. are selected. In the work Significant Surge and Swab Offshore Brazil Induced by Rig Heave during Drillpipe Connections, the authors show that surge and swab during drillpipe connections on floaters may challenge the available pressure window for some wells, even in regions with calm weather such as Brazil. Managed pressure drilling (MPD) is a technique that improves control of the downhole pressure, but it is not possible to compensate fast downhole pressure transients. A downhole choke combined with continuous circulation is one of the potential solutions.

In Analysis of Torsional Stick-Slip Situations from Recorded Downhole Rotational Speed Measurements, the authors find that more than 64% of stick-slip vibrations occurred in off-bottom conditions. The off-bottom stick-slip was either related to using topdrive speeds below 120 rev/min or to reaming down during reciprocation procedures.

In Prediction of Reservoir-Kick Effect and Its Management in the Managed-Pressure-Drilling Operation, the authors present a framework for real-time kick monitoring and management in an MPD operation. The proposed framework and method can estimate, monitor, and manage kick in real time, enhancing the safety and efficiency of the MPD operation. The developed method is validated and demonstrated using a simulated MPD system, a pilot-scale experimental setup, and field data collected from an MPD operation in western Canada.

In Quantifying Global and Random Uncertainties in High Resolution Global Geomagnetic Field Models Used for Directional Drilling, the authors describe the derivation of location-specific global and random uncertainties for use with predicted geomagnetic values from high-resolution models within magnetic measurement-while-drilling (MWD) survey-tool-error models. A sophisticated approach is proposed to provide realistic values at different locations around the globe.

In Simulating Drillstring Dynamics Motion and Post-Buckling State with Advanced Transient Dynamics Model, the authors develop an analysis methodology that is based on the finite element transient dynamics model. The model captures the enriched physics of drillstring dynamics and loading: the large deformation of buckled drillstring, the strong nonlinearity of contact and friction forces, and the dynamically triggered instability caused by drilling rotation. Transient dynamics simulations are conducted for drillstring with the actual well trajectory and rotation speed. The weight on bit is
ramped up gradually, and the drillstring deformation is monitored to detect the onset of buckling or dynamics instability.

In **Measurement of Mud Motor Back-Drive Dynamics, Associated Risks, and Benefits of Real-Time Detection and Mitigation Measures**, the authors detail the advantages to understanding and reducing motor back-drive dynamics, a topic that has not commonly been discussed in the past. A new mechanism of motor back-drive dynamics caused by using an MWD pulser above a steerable motor has been discovered. High-frequency continuous gyro sensors and pressure sensors were deployed to capture the mechanism in which a positive mud pulser reduces as much as one-third of the mud flow in the motor and bit rotation speed, creating a propensity for a bit to come to a complete stop in certain conditions and for the motor to rotate the drillstring backward.

In **Stress Analysis of Variable Ram Blowout Prevention Valves**, the authors use a Lagrangian-based finite element analysis model to study the sealing efficiency and failure criteria of a variable ram blowout prevention valve for two different operating temperatures and drillpipe diameters. The sealing efficiency is studied using two performance criteria: the uniformity of the sealing pressure around the drillpipe and the magnitude of the overall deformation of the elastomer. The results of this study provide many new insights that have the potential to improve variable ram blowout prevention valve design.

### Completion

In **A Novel Experimental Method for Mudcake Removal Efficiency of Spacer**, the authors propose a design for a novel apparatus used to test mudcake removal efficiency and discuss the influence factors of mudcake removal efficiency. The method can evaluate the flushing efficiency quantitatively and provide guidance for designing of spacer.

In **Experimental Evaluation of a New Nonaromatic Nonionic Surfactant for Deep Carbonate Stimulation**, the authors introduce a new and effective aliphatic nonionic surfactant to create a stable emulsified acid system for matrix acidizing at high-pressure/high-temperature conditions, leading to a deeper penetration of acid with low pore volume to breakthrough. The successful coreflood studies in the laboratory using carbonate cores suggest that the new emulsified acid system may efficiently stimulate high-pressure/high-temperature carbonate reservoirs.

In **Design for Reliability: Experimental and Numerical Simulation of Cased and Perforated Completions with Standalone Screen**, the authors combine physical laboratory testing and computational fluid dynamics to assess the potential use of the standalone screen in completing cased and perforated wells at laboratory scale and field scale. The aim is to design a fit-to-purpose sand control method in cased and perforated wells, provide guidelines in perforation strategy, and investigate screen and perforation characteristics. More specifically, the simultaneous effect of screen and perforation parameters, near-wellbore conditions on pressure distribution, and pressure drop are investigated in detail.

In **Understanding Real-Time Job Signatures on Deepwater Cementing Jobs with Dynamic Losses**, the authors review a solution developed to mitigate the lack of a direct flow-rate measurement by computing and displaying the return rate using either a paddle meter measurement or the derivative over time of the volume observed in the rig tanks.

In **Pressure Decline Analysis in Fractured Horizontal Wells: Comparison between Diagnostic Fracture Injection Test, Flowback, and Main Stage Falloff**, the authors present a new approach to model and analyze pressure decline data that are available in unconventional horizontal wells with multistage, transverse hydraulic fracturing. The methods presented in this study allow us to quantify closure stress and average pore pressure inside the stimulated reservoir volume and to infer the uniformity of proppant distribution without additional data acquisition costs.

In **Investigation of Dehydroxylated Sodium Bentonite as a Pozzolanic Extender in Oil-Well Cement**, the authors compare the performance of 13-ppg heated (dehydroxylated) sodium bentonite and fly-ash cement systems. All the dehydroxylated sodium bentonite systems exhibited high stability, thickening times in the range of 3 to 5 hours, and a minimum 24-hour compressive strength of 600 psi. At a concentration of 40 and 50%, the 24-hour compressive strength was approximately 800 and 787 psi, respectively. This was higher than a 13-ppg fly-ash-based cement designed at 40% cement replacement (580 psi).

What effect would a thick wall have on elastic collapse? There really is no way to tell from the classic formulation. In **Thick-Wall Elastic Collapse for Casing Design**, a new set of physically reasonable boundary conditions is proposed for the elastic equations for a thick-walled cylinder, which is then used to determine the collapse resistance for a thick-wall pipe.

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