

The Concept of Wellbore Telemetry Using the Drilling Pipe and Drilling Mud as Single Conductor Transmission Line and the Design

TECHNOLOGY NUMBER: 7147

OVERVIEW

A drilling data transmission technology which utilizes the drilling pipe itself as a conductor

- Utilizes a compact, low-profile signal launcher conformal to boreholes
- Provides realtime, two-way subterranean communication

BACKGROUND

Exploratory drilling, such as in the oil, gas, and mining industries, has come to rely on the collection and transmission of many streams of real-time data to monitor and guide drilling. The use of data-driven drilling methods has allowed safer, smarter, and more environmentally conscious drilling. As significant oil reserves become harder to find and reach, such data collection and transmission technologies become even more crucial for exploration and production (E&P) companies. The advantages in efficiency and ability to drill in previously unfeasible locations may lead to the replacement of conventional drilling methods in coming years.

However, currently available communication technologies used for the purpose of transmitting data between the drill bit to the surface suffer a variety of functionally limiting issues. Low data transmission rates, unreliable signal, signal attenuation in deep boreholes, frequent transmission failures, and the need for a large investment in specialized equipment signal a commercial need in the industry. A need therefore exists for low-cost, reliable two-way subterranean communication for the measuring-while-drilling (MWD) and logging-while-drilling (LWD) practices that are important for data-driven methods of exploratory drilling.

INNOVATION

Researchers have discovered a drilling data transmission technology which utilizes the drilling pipe itself as a conductor along which data can be reliably transmitted with little path loss. This method works in tandem with a compact, low-profile signal launcher conformal to boreholes and enables efficient two-way subterranean communication. The launcher is composed of an open ended helical conductor which concentrically surrounds the drill pipe with appropriate pitch and length forming a compact surface wave launcher. Keeping its dimension smaller than $0.005 \lambda \times 0.005 \lambda \times 0.003 \lambda$, the proposed launcher provides 2% fractional bandwidth at low HF-band. The technology shows superior reliability and transmission rates to existing mud pulse, acoustic, or electromagnetic methodologies. The device also requires

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Category

Hardware

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significantly less cost during its manufacturing or use than competing approaches. The feasibility of the technology and the hardware design have been empirically demonstrated, and it may be used for the production of measuring-while-drilling (MWD) and logging-while-drilling (LWD) data streams.

PATENT APPLICATION

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