TITLE: Integration of AI with RSS

INTRODUCTION: Traditional CSS employs downhole motors that utilize a bend to steer the drill bit, resulting in intermittent sliding and rotating modes. This method often leads to decreased rates of penetration (ROP) during sliding intervals, increased wear on drill bits, and operational inefficiencies due to the need for frequent adjustments by the drilling team. In contrast, RSS allows for continuous rotation of the drill string while steering, which significantly enhances drilling efficiency.

The benefits of using RSS over CSS are manifold. First and foremost, RSS systems provide a substantial increase in ROP by eliminating the inefficiencies associated with sliding intervals. This improvement not only reduces drilling time but also minimizes costs associated with non-drilling operations, such as trips for adjusting tool faces or changing bits. Furthermore, RSS technology enhances borehole stability and reduces the risk of issues like motor stall-outs and bit wear, which are common challenges in deep geothermal wells. The ability to maintain precise control over wellbore trajectories in complex geological formations makes RSS a superior choice for modern drilling applications, particularly as the demand for deeper and more efficient geothermal energy sources continues to grow.

PROBLEM STATEMENT:

1. Mathematical Model Establishment: A rigid and exact mathematical model of RSS is the key factor to achieve excellent control effects. Most mathematical models adopted in current RSS control systems cannot reflect the real working model because their establishments and state observer designs are usually based on some assumptions and simplifications. With the development of neural network, automatic techniques, deep learning and other intelligent modeling techniques based on learning mechanism, these new techniques will be combined with auto regression, augmented state space method and other traditional system identification techniques to comprehensively use model analysis, data-driven and others to make the mathematical model approximate real working process of RSS.
2. Downhole Real-time Condition Measurement and Data Processing: Model construction techniques based on data-driven and learning need stable and reliable real-time measurement to obtain large amounts of multidimensional working data. In the actual working condition the measured data will be disturbed by lots of noise. Therefore, development of data filtering and data mining technologies suitable for RSS will become more important for downhole real-time data processing.

OBJECTIVES:

1. Data collection of RSS parameters.
2. Designing well bore profiles based on the collected data.
3. Designing and testing AI algorithms on the extracted data.

REFERENCE:

<https://www.erdwerk.com/sites/default/files/users/user14/28_2012_DrillingChallenges_RSS_Molasse_GRC_Lentsch_EN.pdf>

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