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Monitored laser grinding by real time nanobots data: A novel mud cake removal approach

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For ensuring casing and cementing quality, mud cake removal is essential. Various problems like stuck pipe take place because of the presence of mud cake. Mechanical methods of water jetting and chemical methods by means of acids, oxidizers, chelating agents and enzymes are currently employed for mud cake removal. However, water jetting can cause water blockage problems. Also, mud cakes of different permeability will be removed unevenly by same intensity water jets. Acids and oxidizers are very reactive but non-specific species, imposing several post perforation problems and formation damage. As an alternative, we propose a new method/device in this study with the usage of nanobots and laser grinding. The nanobots, placed in carrier, can be sent through drill string into the drill bit from where they can be deployed in all directions into the targeted zone. These non-adherent and self-propelled nanobots will move through the vertical permeability of the mud filtrate and would interpret the petro physical properties of the mud filtrate. The sensors would then send this data to molecular processor and with the help of radio frequency transmitter and receiver; we could immediately interpret the real time data from every point in the wellbore. This data would be used to change the intensity of the lasers in accordance with the petro physical properties. Lasers would then vaporize the mud cake according to its thickness and interpretation obtained and will grind the mud cake by creating popped holes. The precision and control over direction and power which laser provides could really be beneficial in mud cake removal and the same device could also be used for various other jobs like perforation and enhancing permeability during production phase. Nanotechnology integrated laser system holds great potential in removing mud cake efficiently and could significantly be useful in multilateral and horizontal wells.
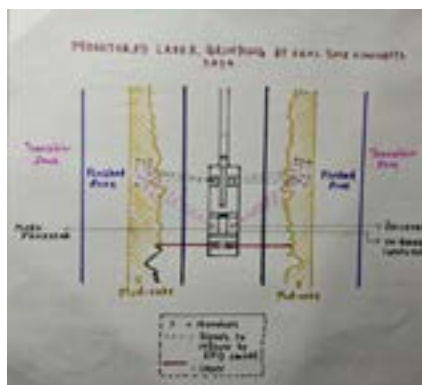

Fig: Monitored Laser grinding by real time nanobots data

Biography

Mohit Jhirwal is a Graduate of Petroleum Engineering at Pandit Deendayal Petroleum University, India. He has been working for SPE PDPU Student Chapter for past 2 years and has received the Outstanding Chapter Award from SPE International.

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