

EFFECTS OF LASER DRILLING ON RATE OF PENETRATION FOR OIL AND GAS WELLS DRILLING

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Abstract

Need for bring a new method of drilling oil and gas wells is necessary. drilling industry was developed, since the rotary drilling superseded cable tools drilling. One of the great parameters that effect on drilling process is ROP. The term ROP contracted, Rate Of Penetration. This paper describes result of research about laser systems in drilling rock samples that give from Iran's formations. Although studying widespread about laser drilling in the world but, so far in Iran not to be done main study about laser drilling systems. The samples of stone which were experimented in this paper were took from various formation of Iran's. the result were encouraging that ROP increase of 10 to 100 time faster by using with laser drilling to rocks penetrate. In this experiment we encountered with limited facilities, so laser system that using in this research have low power. However by using this power obtained precision result. Testing conducted with Free-Electron Laser (CO₂) system that speed setup in 10mm/s with spiral drilling operation.

Result

1. Amount of specific energy (SE) for every sample of rock
2. Rate of penetration (ROP) for each sample of rock
3. Comparison of ROP and SE for saturated and unsaturated samples.
4. Effect of laser drilling on the cost of every foot drilling

Conclusion

Use of laser can have many advantages in drilling industry and this matter is depended on the type of laser and parameters of it. As it was proved in this paper, the entrance of laser to the oil and gas wells drilling will help the advancement of this industry greatly and it will cause the Oil industry to be changed magnificently. As you saw in this paper, the increase of ROP in accordance with decrease of necessary energy, is happened for the unit of rock's volume and this increase of ROP in sandstone is more than the other sample .The most of reservoir are limy in Iran's formation and this mechanism can help the wells drilling of Iran's formation verily by the increase of 10 to 100 times as much the ROP.