

Cavitating Jet Design for Enhanced Drilling Performance

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Abstract : In this paper, a brief literature review on cavitation jets is presented in order to introduce the cavitation mechanism, strategies to assess when cavitation occurs, and the factors that influence cavitation in cavitating jets. The objectivity of the cavitation number often used to predict cavitation is also discussed. The results show that cavitation cannot be foreseen just using the cavitation number. Therefore, more efforts are needed to innovate and develop a self-resonating jet geometry that would be maintains the flow and the pressure in the cavitation condition just earlier than the flow acts on the target that would be used in such operating conditions. This study focused on a particular aspect related to improving drilling efficiency and the rate of penetration (ROP). In addition, a discussion on the methods used to measure cavitation and the factors that affect cavitation occurrence will be discussed. Two different types of cavitation nozzles were designed and tested. It has been shown that the self-resonating cavitation nozzle presents greater performance than standard non-resonating nozzle. It is thus concluded that a self-resonating cavitation jet present a high potential for improving drilling performance.

Keywords : cavitating jet, erosion, cavitation number, rate of penetration (ROP)

Conference Title : ICMME 2020 : International Conference on Mechanical and Materials Engineering

Conference Location : London, United Kingdom

Conference Dates : September 24-25, 2020