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Numerical Study for the First Phase of the Miraah Solar Well Plant in Oman

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Abstract

Offshore oil and gas production utilizes several renewable energy technologies to meet its energy requirements and to enhance oil recovery (EOR). Using renewable energy can diminish fuel consumption and maintenance costs in upstream processes. In addition to reducing noise, emissions, and improving safety, renewable energy can reduce pollution. As an alternative to natural gas, solar thermal EOR utilizes concentrated solar power (CSP). For the Miraah project in the Amal oil field in Oman, solar energy was used to generate steam. 10% of the total steam are produced during phase one of the project. This study presents a computational simulation of the phase one Miraah project, where the total amount of heat necessary to convert 100 gals of cold water to steam at 450 degrees Fahrenheit and 414.7 psi are calculated. According to the results, the total steam injection per hour is 637 tons with a 3.46 % error percentage from that in Miraah project.

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1. Introduction

On the one hand, oil fields and fluid flow are central to many research studies, whether they relate to conventional or unconventional reservoirs [(Al-Husseini et al., n.d.; A. J. Majeed, Abood, et al., 2021; A. J. Majeed, Al-Mukhtar, et al., 2021; A. J. Majeed et al., 2020, 2023; A. J. Majeed & Al-Rbeawi, 2022) .

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