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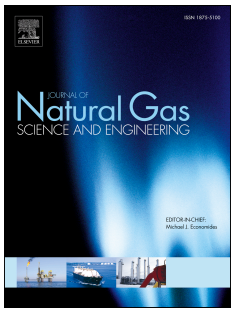

Numerical simulations of gas production from Class 1 hydrate and Class 3 hydrate in the Nile Delta of the Mediterranean Sea

Şükrü Merey, Sotirios Nik Longinos

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Numerical Simulations of Gas Production from Class 1 Hydrate and Class 3 Hydrate in the Nile Delta of the Mediterranean Sea

Şükrü MEREY *; Sotirios Nik. LONGINOS

Middle East Technical University, Department of Petroleum and Natural Gas Engineering, Ankara-Turkey

*Corresponding Author Contact: sukrumerey@gmail.com

Abstract

Gas hydrate reservoirs are considered as near-future energy resources in the world. As well as the many places in the world, there is also gas hydrate potential in the Mediterranean Sea. In this study, by using the literature data, it was aimed to understand whether the Mediterranean Sea includes necessary parameters for producible gas hydrate reservoirs. It was shown that the Mediterranean Sea contains all of these parameters (source gas, appropriate pressure and temperature, coarse sand potential, etc.). The only bottom-simulating reflections (BSRs) were detected in the Nile Delta of the Mediterranean Sea. In the conditions of these BSRs, the gas production potentials from Class 1 hydrate and Class 3 hydrate were analyzed by applying depressurization method with and without wellbore heating at 50^oC with HydrateResSim numerical simulator. It was observed that both gas hydrate layer in Class 1 and gas hydrate in Class 3 hydrate dissociated fully. However, the contribution of free gas layer in Class 1 hydrate on cumulative gas production was enormous so it was stated much more exploration studies are necessary in the Mediterranean Sea to detect Class 1 hydrates and BSRs. During the simulations, ice formations along the wellbores were not detected for both Class 1 hydrate and Class 3 hydrate. Hydrate reformation at 3.5 MPa and below 3.5 MPa in Class 3 hydrate was observed along the wellbore but the wellbore heating at 50^oC was enough to avoid gas hydrate reformation along the wellbore. The warm temperature of the sediments of the Mediterranean Sea was advantageous for effective depressurization. However, it was proved that methane-carbon dioxide replacement method is not applicable for the potential Mediterranean Sea gas hydrates due to the warm seafloor temperature (~14^oC) of the Mediterranean Sea.

Keywords: *Mediterranean Sea, gas hydrate, methane, BSR, HydrateResSim, simulation*