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Numerical Investigation of CO_2 Solubility in Brine during Continuous CO_2 flooding and Optimization of Different Parameters

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Abstract—A huge volume of crude oil, after conventional primary and secondary oil recovery mechanisms are left behind in reservoir. To produce this crude oil, currently many tertiary enhanced oil recovery mechanisms are in design and operation stage. Due to the global demand of crude oil and its high prices, it developed a great interest in enhanced oil recovery mechanisms. Injecting gas is a reasonable method to enhance oil recovery because of the low viscosity of the gas and least formation damage caused by the gas. Compared to other gases carbon dioxide flooding is the second method used widely in the world to maximize the production. Especially when the reservoir pressure is depleted during primary and secondary recovery mechanism. CO_2 flooding can be used both in sandstone and carbonate formations. Due to the increased amount of carbon dioxide concentration and its effect on the global warming, Carbon dioxide flooding achieved more potential for future growth by reducing carbon dioxide emission from many sources and can extract additional oil from the reservoirs and can reduce greenhouse effect. Therefore, in this study the main focus is to conduct a comprehensive study on CO_2 solubility during its flooding to improve oil recovery and the effect of the pressure, temperature and CO_2 concentration on the CO_2 solubility and to optimize different parameters and its effect on oil recovery during CO_2 flooding. CO_2 solubility in brine is a function of both pressure and temperature. Brine concentration has also effects on solubility. For this purpose, an ideal reservoir model is prepared for XYZ field using CMG GEM module.

Keywords— CO_2 Flooding, Optimization, Enhanced Oil Recovery, CO_2 Solubility, CMG GEM