Calculations of Gas-liquid Equilibrium in Wellbore with High Carbon dioxide Flow

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Carbon dioxide injection not only enhances the oil recovery dramatically, but also it will reduce the greenhouse effect, therefore, Carbon dioxide injection technique is applied extensively. During the process of carbon dioxide displacement, when carbon dioxide breaks though into oil production wells, carbon dioxide content will impacts the phase state and physical properties of the mixed liquor in the wellbore, as a result, it will affect the calculation of temperature and pressure in oil production wells. Applying the conventional black-oil model to calculate the phase state of the miscible fluids is unacceptable. To tackle the problem, this paper uses the gas-liquid flash theory and component model to program software, so that the phase state (gas, liquid or gas-liquid) and physical properties of the mixed liquor (including hydrogen sulfide, carbon dioxide and hydrocarbon) under initial conditions is calculated, moreover, the impact of carbon dioxide content on the physical properties(mainly including density, viscosity, specific heat at const pressure, surface tension, etc) of mixed liquor in oil production wells is analyzed in this paper. The comparison of the results shows that this model can meet the engineering needs with high accuracy.