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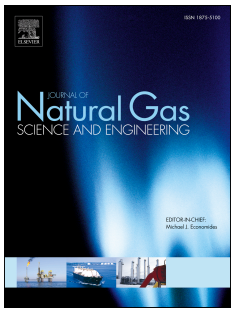

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Experimental study on dissociation of hydrate reservoirs with different saturations by hot brine injection

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Abstract：

Hot brine injection is one of the effective ways to dissociate natural gas hydrate (NGH), and the hydrate saturation is a key parameter which affects the thermal dissociation characteristics of hydrate reservoirs. In this study, experiments of hydrate dissociation by hot brine injection are conducted with a self-designed experimental apparatus. The gas production performance, the variation of pressure and temperature, as well as energy efficiency are investigated with hydrate saturation of 16%, 32%, 48% and 64%.The results show that the average gas production rate will rise with the hydrate saturation increases from 16% to 48%, while when the hydrate saturation increases to 64%, the gas production rate will decrease remarkably due to the high pressure resulting from low permeability and Jamin Effect. The heating range, the temperature increment and the movement rate of thermal front will all decline with the increase of hydrate saturation. The optimal production performance will be achieved when the hydrate saturation is 48% under the experimental conditions, in which case the energy efficiency at the end of hot brine injection is 7.0, and the percentage of cumulative gas production is 65%. Therefore, hot brine injection is not a good choice when the hydrate saturation is equal or greater than 64%.

Keywords: Natural gas hydrate; Hydrate saturation; Hydrate dissociation; Energy efficiency; Hot brine injection

1 Introduction

As a potential energy resource with high quality and efficiency, natural gas hydrate is attracting more and more attention from all over the world. The methods of hydrate dissociation include depressurization, thermal stimulation, inhibitor injection, CO_2 exchange and mechanical excavation, et al. [1-3] Up to now, only one commercial exploitation of hydrate reservoir has been

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