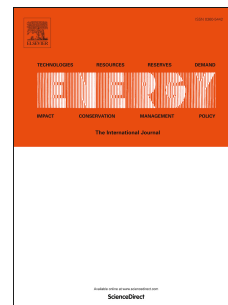


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Construction and Simulation of Reservoir Scale Layered Model for Production and Utilization of Methane Hydrate: the case of Nankai Trough Japan

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Abstract: This study is focused on the utilization of oceanic methane hydrate as an energy resource under the real production situations of Nankai Trough, Japan. Due to the complex geological conditions and the sensitive thermal-mechanical properties of methane hydrate bearing layers, it is very difficult to extract and utilize the methane hydrate stably and economically. The current status of development in Japan and major challenges from real reservoir-scale analysis are discussed. Low-carbon emission process is discussed and shown into detail with careful numerical modeling procedures. The numerical model is constructed based on the geological conditions of Nankai Trough of Japan. Numerical model is also scaled-up from single thin-layer to thick multi-layer model for real reservoir conditions, based on the recent geological survey data. In the current study, the production behaviors, boundary conditions and reservoir parameter effects are discussed into detail. The predicted production rate level in this simulation agrees with recent real tests. It is found that proper selection of layer models and production strategy is very important for large-scale simulation and prediction. Combined methods and strategic production design are recommended in future real tests.

Keywords: Methane hydrate, Energy conversion, Multi-phase flow, Numerical analysis, Nankai Trough

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