

Sand Production with Methane Hydrate Decomposition in Sediments

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Methane hydrate which exists under sea bed is expected as new natural resources. In these days, the methane hydrate occurrence in a pore spaces of sandy layer has been made an object of resource development, because sandy layer has high permeability. The methane hydrate bearing layer which discovered in NE-Nankai Trough is confirmed sand mud alternate layer of the turbidite origin and formed in sandy pore space filling type. In order to production technique of the methane gas from such methane hydrate, the depressurization method is considered usefulness in view of the cost effectiveness. However, sand production makes a production trouble when the unconsolidate sand with production gans and water flow out to inside well bore. Therefore, it is important that the behavior of the sand production of the sedimentary layer with the decomposition of methane hydrate.

In this study, we carried out the experimentally study of sand production by simulating the depressurization method. An artificial methane hydrate sediment of the sandy pore space filling type was used. As the results, sand production phenomenon is occurred in the situation of continuing decompression at methane hydrate unstable region. In addition, the water flow is one of the main factores to cause the sand production phenomenon at unconsolidated sand sediments. Thus, we carried out the linear velocity measurement at the critical sand production point. We fund that the critical linear velocit of water may be described as the function of perforation area/sand particle grain cross-section ratio and effective stress. In addition, we measured the internal construction of after sand production core by X-ray computed tomography. As the changing effective stress, we fund that there were different appearances of shear band appearance and micro skeleton structures.

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