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Measuring Shear Stiffness of Interface between Production Well and Sediments

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ABSTRACT

Depressurization, one of the methods for methane hydrate production on the seabed, is inducing dissociation of gas hydrates by reducing pore water pressure of the hydrate-bearing layers. When methane gas and water dissociated by depressurization and pumped out through the production well, the GH natural layer is subject to compressive stress at the top and bottom, which also stress applied to the production well surface. The shear stress acts on the interface between production well and sediments increases with displacement level, which large shear stress will cause destruction of the production well. In the laboratory scale, shear stress on the interface between production well and sediments is simulated with various conditions. The shear stress will be affected by displacement level, shear stiffness and confining stress.
In this study, interface between production well and the silty sand was simulated with artificial specimen and sus plate. According to the depth of the sediments affect confining stress on the interface. Therefore, various confining stress conditions were applied during the experiments. Also roughness of the sus plate surface were controlled with various size of sand paper. However, effect of roughness on the results is relatively smaller than that of confining stress change. Through the experiments shear stress developed as displacement increased and finally converged. The ratio between measured shear stress and displacement shows the shear stiffness of the interface with specific confining stress condition.

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