



Journal of the Japan Society of
Naval Architects and Ocean Engineers
The Japan Society of Naval Architects and Ocean Engineers

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ONLINE ISSN : 1881-1760

PRINT ISSN : 1880-3717

Journal of the Japan Society of Naval Architects and Ocean Engineers

Vol. 7 (2008) pp.65-72

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Research on the Method of Strength Evaluation of Drill Pipe for Deep Drilling

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(Accepted February 29, 2008)

Summary: During drilling operation various forces are exerted on a drill pipe such as a tension due to the weight of the drill string and vessel heave, as well as a bending stress due to vessel movement and ocean current. There is also a hoop stress due to holding by conventional tools "slips" which translate axial load to transverse load. As drilling depth increases, the hoop stress can become greater and can actually damage or in the extreme case crush the drill pipe, called slip-crushing. So, it is necessary to evaluate maximum stress which is assumed to be obtained by superimposing these stresses corresponding to actual drilling operation. There is also another possible strength problem - fatigue strength. Since drilling operation progresses by rotating the drill strings under the condition that it will be bent due to vessel motion, the bending stress will act as an iteration stress. Especially in deep drilling, since the tension on the top of the drill string acting as an average stress become greater, the fatigue strength will be descended. Therefore, it is necessary to establish the method of strength evaluation of the drill pipe including consideration of the hoop stress and evaluation of fatigue strength which can become critical in deep drilling. This paper describes the method of strength evaluation of drill pipe for deep drilling by means of conducting the strength evaluation using it.

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