Investigation of slamming on board the SA Agulhas II

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Slamming has proven to be a persisting and concerning problem on the SA Agulhas II. Various full scale measurements have been conducted over several voyages in the southern ocean. Past research has concluded that vibration has reached levels were damage is possible in the stern and is probable in the bow during open water navigation (Soal, 2014). Slamming is known to originate in the bow or stern depending on the ships speed and orientation with regards to the swell, this often results in costly and time consuming detours for a vessel (Kapsenberg, 2011). The future investigation of wave slamming phenomena is to better understand its characteristics with relation to potential structural failure. This involves the accurate identification of slamming events from acceleration measurements; by making use of an algorithm developed from structural health monitoring methodologies. Proposed techniques include spectrograms, wavelet transforms and outlier analysis to identify the impulsive events in large datasets. Once an event has been identified the resultant transient vibration, also known as whipping, will be analysed as the responses propagate through the vessel (Dessi, 2014). The Identification and analysis of these signals and resultant ship responses are vital towards understanding the causes and impacts of slamming problems. Another avenue of study is the recording of reliable sea state information (wave height, speed, direction, etc.). Through synchronizing the sea state information with the identified slamming events and vessel operational parameters it would be possible to correlate probable slamming incidence. The ideal case would be to be able to predict the severity of slamming using sea state and vessel operational information. There is clear potential to further investigate structural vibration in order to better understand and predict slamming events in the future.

Dessi, D. (2014). Whipping-based criterion for the identification of slamming events. *International Journal of Naval Architecture and Ocean Engineering, Vol 6*, 1082-1095.

Kapsenberg, G. (2011). Slamming: where are we now? *Philosophical Transactions: Mathematical, Physical and Engineering Sciences, Vol.369, No. 1947, The mathematical challenges and modelling of hydroelasticity*, 2892-2919.

Soal, K. (2014). *Vibration Response of the Polar Supply and Research Vessel the S.A. Agulhas II in Antarctica and the Southern Ocean.* Stellenbosch: Stellenbosch University.