APPLICATION OF CFD FOR SLOSHING ASSESSMENT

Diebold Louis
Head of Sloshing Assessment
Bureau Veritas
Neuilly-Sur-Seine, FRANCE
louis.diebold@bureauveritas.com

ABSTRACT

The market of Liquefied Natural Gas Carriers (herein after called LNGC) saw rapid changes during past years and will change further during next years. New sources of gas (shale gas) and new demand are changing the traditional gas trades. These changes are creating demand for flexible floating LNG facilities and for all types and sizes of LNG carriers. Also, the development of Russian Arctic gas requires new ship routes. For such projects, dedicated LNG carriers are being built. Finally, many projects considering Natural Gas (NG) as fuel are under development. For such LNG fuelled ships, the storage and use of natural gas on board non specialized ships create specific risks to be addressed. For all these floating units, LNG sloshing is a major issue to be addressed.

The proposed paper deals with the application of computational fluid dynamics (CFD) calculations for the sloshing assessment of such new LNG floating units. For classical LNGC capacities, sloshing tests have brought a great experience to the industry. However, for new types of tanks (new geometries for fuelled ships) or some particular ship motions (such as ship/ice interaction), application of sloshing model tests can be limited by the number of pressure sensors and the performance of the test rig. This is the reason why a new CFD post-processing tool called "Dynamic Probes" was developed by Bureau Veritas (herein after called BV). This tool, on the contrary to sloshing tests, permits to get a complete cartography of all the sloshing events over the tank’s boundaries. Applications to classical LNGC, ship/ice interaction, LNG Regasification Vessels (LNGRV), Floating Storage Regasification Unit (FSRU), Floating LNG (FLNG), small scale LNGC and LNG fuelled ships will be presented.

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