RPSEA

Research Partnership to Secure Energy for America

Vortex Induced Motion Study for Deep Draft Column Stabilized Floaters (S&ES)

PROJECT FACT SHEET

Program
2011 Ultra-Deepwater

Project Number
11121-5404-03

Start Date
December 2013

Duration
24 months

RPSEA Share
$1,939,259

Cost Share
$485,881

Prime Contractor
Houston Offshore Engineering

Participants
MARIN
Los Alamos National Laboratory
John Halkyard& Associates
Red Wing Engineering

Contact Information
Arun Antony
281.436.6129
aantony@houston-offshore.com

Bill Head
bhead@rpsea.org
281.313.9555

Reports and Publications

None

Research Objectives

The objective of the study is to improve the overall mooring system safety and riser system integrity by testing design parameters for deep draft column stabilized floaters (DDCSFs) to determine which have the most impact on vortex induced motion (VIM), and which VIM mitigation strategies are preferred for DDCSFs. DDCSFs have excellent applicability to development of challenging reservoirs in deepwater and ultra-deepwater in the Gulf of Mexico. However, increased payload requirements and a general desire to reduce platform motions have resulted in larger platforms with deeper drafts, making them susceptible to VIM. Improved VIM performance has the potential to increase hydrocarbon reserves by making reservoirs more accessible to safe, reliable development.

Approach

The study utilizes computational fluid dynamics (CFD) analysis and model testing to determine the sensitivity of VIM responses to DDCSF geometric parameters. The project studies both four-column DDCSFs and multi-column DDCSFs, specifically, the paired-column DDCSF developed by Houston Offshore Engineering (HOE). In addition, an evaluation of potential VIM mitigation devices is included in both the CFD and model test scope.

The work is divided into two phases. The Phase 1 scope of work is primarily background research into VIM data and design practices, sizing DDCSFs and performing CFD analysis to understand DDCSF VIM sensitivity and evaluate VIM mitigation strategies. The Phase 2 scope of work is primarily model testing and preparation of design guidance for the industry.

The study will be led by Houston Offshore Engineering and other participants are Los Alamos National Laboratory, MARIN, John Halkyard Associates and Red Wing Engineering. HOE is a well-known engineering contractor for the oil and gas industry with specific expertise in the detailed design of floating offshore platforms. Los Alamos National Laboratory is one of the Nation's leading scientific and engineering research institutions with unparalleled computing infrastructure and fluids expertise to investigate a wide array of challenging fluid dynamics problems. MARIN is a world-class model test facility with extensive experience in many aspects of testing offshore platforms. John Halkyard has extensive VIV and VIM model test experience on risers, spars and semisubmersibles. Samuel Holmes has extensive engineering experience with specialization including the study of fluid mechanics and CFD
.
The total project cost is estimated to be about $2.4mm, 80% of which is contributed by RPSEA. Remaining 20% is contributed by industry and participant cost share. The project is expected to be completed by the summer of 2015. Key deliverables associated with the project are model test data, CFD results and a recommended practice document that contains beneficial guidance for the oil and gas industry.

Acknowledgements

Houston Offshore Engineering wishes to thank members of its Working Project Group and RPSEA for their advice and support.