

The authors are thankful for the comments provided by the three reviewers and the editors. We adapted the manuscript according to the suggestions and marked the corrections. A full history of the changes is available via Overleaf (<https://www.overleaf.com/read/tztjpxskczm>; read only). The following document provides [a point to point response to the individual reviews](#). Therewith, we hope that we could clarify the open points and we strongly believe that the quality of the paper has been increased as a result of the reviewers' valuable comments. Thank you.

Reviewer 3

Investigating the dynamic response of offshore structures and vessels under wave forcing is a complex issue relevant to the field of applied ocean and offshore engineering. The analysis requires suitable investigation approaches and modelling techniques [1-4]. In particular, the dynamic analysis of floating fluid-filled structures introduces additional complexity because the response of the body is affected by the interaction with the stored fluid undergoing large displacements and, possibly, breaking [5]. Some numerical models, based on the Smoothed Particle Hydrodynamics (SPH) method have been successfully developed for the analysis of such complex interactions [6-7]. Despite numerical modelling allows obtaining good results accuracy in reproducing laboratory experiments, physical modelling is complementary for model validation.

The present manuscript describes the results of laboratory experiments that extend a previous work on a fluid-filled floating cylinder subjected to roll and pitch motion. In particular, the present work focuses on the switch between pitch and roll in the cylinder under wave action as induced by the sloshing of the internal water volume. The influence of mooring system (i.e. pre-tension) and of the experiment duration is also investigated.

In my opinion, the manuscript can be considered for publication after major revision.

General Comments

The paper is clearly written.

English spelling is appropriate. Moderate English changes are required (see below).

The introduction section and the review of technical literature are quite suitable. Anyway, I suggest enhancing it by expanding a bit the topic of numerical modelling. As a help, some useful references are provided below.

[The authors thank the reviewer for her/his comments and work. The introduction of the previous paper covered far more topics including numerical simulations but for this paper we focus on the roll response. Nevertheless, we fully agree that SPH brings significant advantages and this meshless approach is in our opinion the next logical step to model such big motions without spending a significant portion of the calculation time to refreshing the computation grid \(connected with potential numerical problems\). Hence, we included this in the introduction as well as the mentioned references \[5-7\].](#)

Major concerns

As said by the Authors, the provided dataset includes a wide range of experiments with a clear pitch or roll response; this dataset can be used for the validation of numerical simulations.

We fully agree, this is the aim of the paper.

Based on this statement, the main concern is the following.

The structural dynamics is coupled with the motion of the filling fluid that, however, has not been investigated in this study. What is the actual usefulness of these experimental data for validation of numerical models aiming at simulating the Fluid-Structure-Fluid interaction described in this work? Please carefully clarify this aspect.

The authors understand the concern and we agree that the FSF interaction could be interpreted that the deformation of the structure has a significant influence on the fluid/behaviour of the structure. Such an example could be found in flexible riser pipeline, wave energy converters as well as in oscillating water columns with the obvious Anaconda concept [A,B]. In the case of the floating cylinder, the very small deformations of the structure are not explicitly measured and the installation of strain gauges is one option for further experimental investigations. Hence, the provided data set doesn't deliver structural measurements hence the structure is assumed as a rigid body (the measurements of the individual markers with the motion capturing system support this). In the literature, Fluid-Structure interaction mainly focused on the structural aspect including either only a one-way (fluid as an input for the structural simulation) or two-way coupled system (iterative solution of both physics), which is for example needed to reach the best validation results for hot gas turbines. But FS-interaction is also used in the context of floating objects where the motion is far bigger than any deformation. The author experienced that for a wider audience (students, colleges, friends, ...) the connection of floating bodies and sloshing is not as obvious as mentioning FSF interaction. Hence, we included this also in the paper and agree that this has to be clarified.

As a first step, we deleted the FSF interaction in the keywords, hence a detailed explanation could not be added. Furthermore, we added in the abstract as well as the main text body a clarification that we assume the structure as rigid hence the deformations are far smaller than the motions of the floating cylinder, which is in the focus of the paper. We hope that this clarification in the paper finds the support of the reviewer and ensures the elimination of any risk of misunderstanding.

[A] Chaplin, J.R.; Heller, V.; Farley, F.J.M.; Hearn, G.E.; Rainey, R.C.T. Laboratory testing the Anaconda. Philos. Trans. R. Soc. A Math. Phys. Eng. Sci. R. Soc. 2012, 370, 403–424.

[B] Farley, F.J.M.; Rainey, R.C.T.; Chaplin, J.R. Rubber tubes in the sea. Philos. Trans. R. Soc. A Math. Phys. Eng. Sci. R. Soc. 2012, 370, 381–402.

Minor concerns

Line 82: the following sentence seems incorrect "The initial investigated compared the two ballast options"; may be "investigations" must replace "investigated"

Line 107: please change to "as a validation"

Line 140: please change to "with regular waves"

Lines 379, 394 and 409: is the use of bold type in the main text allowed by the journal standard?

All mentioned mistakes are corrected. Thank you. We didn't find a specific restriction in the guidelines provided by the journal. At the moment, we would like to leave it as it is and if it's a problem the very capable production team of MDPI hopefully has a solution.

References

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2. Petrini F., Manenti S., Gkoumas K., Bontempi F. Structural design and analysis of offshore wind turbines from a system point of view. Wind Engineering Volume 34, Issue 1, 1 January 2010, Pages 85-108
3. Manenti S., Leuzzi G., Monti P., Cerquarelli V. Wind-wave hindcasting on offshore wind turbine through coupled atmospheric and spectral models. Proceedings of the 12th International Conference on Engineering, Science, Construction, and Operations in Challenging Environments - Earth and Space 2010, Pages 2143-2151; Honolulu, HI; United States; 14 March 2010 through 17 March 2010; Code 81209.
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