Discussion sheet

IWWWFB International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Numerical simulation of fluid-structure interaction using a level-set immersed boundary method

Authors: Bai W., Huo C.

Discusser: Bingham H.B.

Question / Comment:

Your examples were for simple closed form geometries. What is your strategy for finding the body points when you move to more complex geometries?

Reply:

Many thanks to Prof. Bingham for his valuable comments. Actually, our current algorithm was designed for arbitrary two-dimensional bodies. For arbitrary bodies, we can always discretize the body surface into many line segments. Our algorithm will work on these line segments. Depending on different slope of the line segment, we have different treatments. In my presentation, I have shown a circular cylinder in the fluid domain. The circular cylinder consists of many line segments of any possible slope, which is I think a good example to test our algorithm. Based on our good results for a circular cylinder, in principle, we can say it is applicable to other more complex geometries. It should be mentioned that the current algorithm is not valid for three-dimensional bodies.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A note on added resistance for slow ships

Authors: Bingham H.B., Afshar M.A.

Discusser: Kashiwagi M.

Question / Comment:

In the near-field method for computing the added resistance, the relative wave height at $z = 0$ must be evaluated, which is not easy with constant-panel method. Thus a higher-order boundary element method can be recommended, giving much better and faster convergence with increasing the number of panels. How do you evaluate the relative wave height at $z = 0$ in the framework of constant-panel method?.

Reply:

The wave elevation in TIMIT is evaluated from the pressure at the centroid of a waterline panel, so I agree that this will converge slowly. This is one motivation for our F.D. approach.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A note on added resistance for slow ships

Authors: Bingham H.B., Afshar M.A.

Discusser: Hermans A.J.

Question / Comment:

Wave diffraction in the slow ship case is studied among others by E. Baba some time ago. Special attention is paid to the diffraction of short waves by VLCC's. Pictures show that in front of the blunt ship a caustic occurs. I have shown that the "ray method" gives good results for the sphere, the double body flow is used as base flow. Tim Bunnik solved the linear diffraction problem for sailing ships. He used as base flow the fully non-linear steady flow. When you do this at small but finite Froude number the computed added resistance agrees with experimental results (for that particular ship). Results are shown in his PhD thesis and later publications.

Do you have any idea in what range of Froude numbers and frequencies one may use the double body flow as base flow. Figure 3 suggests that you are not only interested in Wigley hulls but also in blunt ships.

Reply:

Thank you for your comments and references. We are indeed interested in fuller-form ships. Our feeling is that the double body linearization gets generally better as the speed reduces and as the ship becomes fuller. At low speed, the steady wave pattern is generally of small amplitude and with short wavelength, so neglecting it could be reasonable.

Discussion sheet

28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A note on added resistance for slow ships

Authors: Bingham H.B., Afshar M.A.

Discusser: Kim Y.

Question / Comment:

In short waves there is still a debate if linear theory works. So far, the solutions of most computations did not show good correspondence with experiments. Do you think that linear theory will apply in short waves?

Reply:

In short waves, we like to use Faltinsen's method but we expect that converged 3D calculations should give the same result.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Lagrangian modelling of extreme wave groups

Author: Buldakov E.V.

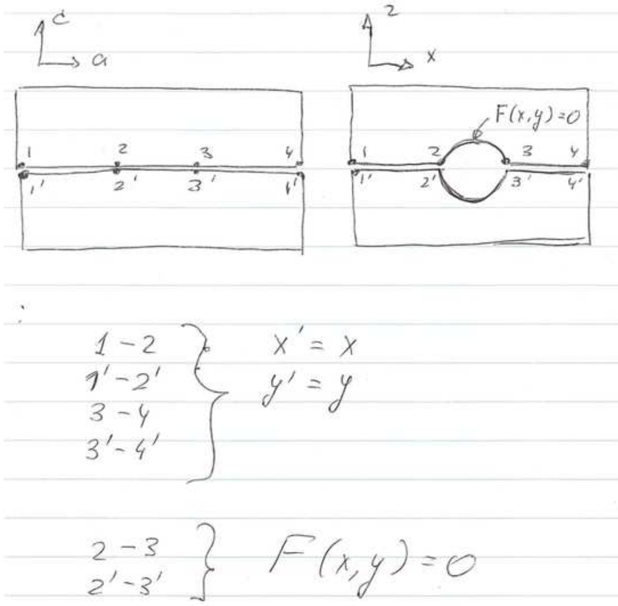
Discusser: Eatock Taylor R.

Question / Comment:

What would be the implication of extending your analysis to include a submerged cylinder, as shown in your second slide?

Reply:

Lagrangian approach allows convenient treatment of complicated geometries. The only requirement is that the $(a, c) \to (x, z)$ mapping at $t = 0$ is not singular (J is finite). This means that Lagrangian and physical domains should have the same connectivity. There are different ways of achieving this. The approach I am planning to implement is splitting a double-connected physical domain into 2 single-connected domains, as shown in the picture.



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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Extreme wave run-up on a vertical cliff

Authors: Carbone F., Dutykh D., Dudley J.M., Dias F.

Discusser: Grue J.

Question / Comment:

Please comment on the appropriateness of the r.h.s. of equation (2) of representing the effect of dispersion, in the highly dispersive waves modelled in your figure 1. There are many examples where an improved modelling of the dispersion is required. For similar flows, see the full inclusion of dispersion in Grue *et al.* (2008), *J. Geophys. Res.*, **113**, C05008.

Reply:

We are presently performing the same simulations with the full Euler equations and we will check the influence of weak vs strong dispersion.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: On the wave resistance of an immersed prolate spheroid in infinite water depth

Authors: Chatjigeorgiou I.K., Mavrakos S.A., Miloh T.

Discusser: Doctors L.J.

Question / Comment:

My first comment is that this is the Neumann-Kelvin solution for the ellipsoid, so that it is only valid for reasonably large depths of submergence.

Secondly I should mention that Dr. Tim Gourlay at Curtin University in Perth, Australia, is also working on this problem. I will give you the contact details. Finally I would like to know how many terms you used in the infinite series to approximate the body.

Thank you for an interesting presentation.

Reply:

We solve indeed a Kelvin-Neumann problem for a fully submerged spheroid BUT without using a source distribution over the surface and solving a Fredholm integral equation of the 2nd kind (as most methods do). Thus, at least in this respect, we believe that our approach using Havelock's relation is superior over existing numerical codes.

We will be very happy of course to get familiar with Gourlay's work when completed, learn more about his methodology and then try to compare our WR results against his data.

The number of terms which are required for convergence is roughly 5. The latter figure corresponds to the degree of the spheroidal harmonics as the order is explicitly specified by the degree.

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28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: On the wave resistance of an immersed prolate spheroid in infinite water depth

Authors: Chatjigeorgiou I.K., Mavrakos S.A., Miloh T.

Discusser: Newman J.N.

Question / Comment:

Equations (6) and (7) may be a little misleading. If (6) is applied on the mean position, as usual, there are additional terms on the right hand sides due to the gradient of the steady velocity field (cf. Timman & Newman *J. Ship Res.*, circa 1961). Regarding (7), the appropriate contour to satisfy the radiation condition in (4) is different for the four poles, as shown in the early papers by Haskind, Brard, etc (cf. Wehausen & Laitone). Thus the sign of the last term in (7) is either + or − depending on the pole.

Reply:

In order to avoid confusion, it is emphasized that we do not attempt to solve here the radiation problem and choose to concentrate only on the diffraction problem of a rectlinearly moving spheroid under a regular monochromatic ambient wave field of arbitrary heading relative to the straight course. Thus, we ignore contributions due to body oscillations about its mean position (i.e. zero amplitudes and no m-term). The additional wave loads due to radiation modes will be computed elsewhere by including the interaction between the steady and six unsteady potentials in the FS b.c. (accounting for the Timman-Newman reverse flow relationship).

Regarding the sign of the CPV term, the sign should clearly account for outgoing waves (Sommerfled radiation conditions). It represents the way of circumventing the pole and may be uniquely determined by using Rayleigh or Lighthill methods (asymptotically small viscosity). In any case for the wave resistance problem the sign of this term is minus as stated and same is true for the diffraction problem.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Modelling wave interaction with a surface-piercing vertical cylinder using OpenFOAM

Authors: Chen L.F., Morgan G.C.J., Zang J., Hillis A., Taylor P.H.

Discusser: Grue J.

Question / Comment:

By reducing Ka from your value of 0.25, to the range $0.1 - 0.15$, you should expect to obtain the secondary strong load cycle in the force!

Reference: Grue, 2011, *Theor. and Appl. Mech. Lett.*, **1** (6), Fig. 9.

Reply:

My work now is focused on using OpenFoam to reproduce the experimental results obtained from DHI in 2009. This is a good idea, would be our future work then.

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28[TH] INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Free surface determination from pressure measurements at the sea bed

Author: Clamond D.

Discusser: Beck R.

Question / Comment:

Your analysis assumes a flat seabed. How would your formulation change for a seabed that was not flat?

Reply:

In case of varying bed, a new solution has to be derived. A similar approach would be feasible, however.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A second order ordinary differential equation for the frequency domain Green function

Author: Clément A.H.

Discusser: Duan W.Y.

Question / Comment:

Thank you for interesting results. The derived differential equation is in real number form (eq. 11), but the initial condition (eq. 12) is zero for both $G(r, z, 0)$ and $\partial G/\partial\omega(r, z, 0)$. The question is how to stepping in frequency to get the imaginary part.

Reply:

You are right. For the imaginary part, the first non-zero derivative is the second derivative. So a higher order ODE could be necessary here.

Discussion sheet

28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A second order ordinary differential equation for the frequency domain Green function

Author: Clément A.H.

Discusser: Meylan M.

Question / Comment:

Normally, in computer code, the frequency is fixed and the G.F. is evaluated for multiple r values. In your approach, it seems the r value is fixed and you are varying the frequency ω. What are the consequences of this?

Reply:

In BEM codes developed for sea-keeping computations, the Green function must be evaluated for all the couples of (field point, source point) determined by the discretization of the body (ies). Generally, but it is not mandatory, the diffraction-radiation problem is solved for a range of frequencies to recover the hydrodynamic coefficient curves as a function of frequency. So, this frequency stepping procedure is well fitted to use my ODE to upgrade the matrix of the problem. But if you want the result for a single frequency you are right that using the ODE is not useful in that case.

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28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A numerical strategy for gas cavity-body interactions from acoustic to incompressible liquid phases

Authors: Colicchio G., Greco M., Faltinsen O.M.

Discusser: Grue J.

Question / Comment:

May the equations be strongly simplified, so that a scaling law for the pressure may be obtained? For the plate application, may a double explosion be relevant?

Finally, what is the Mach-number?

Reply:

The Mach-number varies in time, it is large close to the explosion time (M 0.5) and becomes smaller at the time compression wave hits the plate (M 0.1, for an explosion taking place at 4m). When the Mach number becomes that low, yes, it is possible to simplify the problem as we have shown in a paper submitted for the Euromech colloquium n.555. However here a general formulation is considered which can be applied even to the case the explosion takes place closer to the plate and no simplification can be used.

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28^TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A numerical strategy for gas cavity-body interactions from acoustic to incompressible liquid phases

Authors: Colicchio G., Greco M., Faltinsen O.M.

Discusser: Korobkin A.

Question / Comment:

Q1: Where do the 3D effect come from? I think axisymmetric solution can be sufficient.

Q2: I think compressibility of water and plastic deformations should be included at the same time. Is this the case?

Reply:

Answer 1:

In the example shown at the workshop, an axial-symmetric solution can be sufficient but the solution algorithm is general and can be applied also to the case the explosion does not take place below the center of the plate. In the latter case the axial-symmetric solution cannot be applied anymore.

Answer 2:

At the moment, the solution algorithms are not directly coupled but this is the next step in our study.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A model test for the wave interaction with a four-cylinder structure

Authors: Cong P.W., Teng B., Zhang K., Huang Y.F.

Discusser: Evans D.

Question / Comment:

The first reference you quote should be by Evans & Porter, not Evans & Linton. In that paper we found that if the 4 cylinders were placed close together — with one radius between them —, the force on one of them was 50 times that of a single cylinder. It might be interesting to see experimentally what occurs in this case at second order.

Reply:

Thank you very much for Prof. Evans' comments.

I am sorry that I made a mistake in the authors' names of reference [1].

In present model we focused on the free surface elevation and interest phenomena were observed both at the first order and second order. The force was not measured in present model tests.

Your study suggests that when near-trapping phenomenon occurs inside the four-cylinder structure, the magnitude of force can be largely magnified. It is an important phenomenon and as your suggestion it is interesting to observe this phenomenon in the model test. I hope that corresponding work can be carried out next.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: The limits of applicability of shallow-water wave theory

Author: Doctors L.J.

Discusser: Kim Y.

Question / Comment:

Do you iterate to get sinkage and trim? If not, do you expect that shallow-water wave theory works in a more wide range of depth Froude numbers?

Reply:

No. I did not iterate the vessel in sinkage and trim, presumably to recalculate the force and moment. According to linear theory, it would be inconsistent to do so, because this would be a second-order effect. I expect that nonlinear and unsteady influences, ignored in the present work, will be more significant near a depth Froude number of unity.

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28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: The limits of applicability of shallow-water wave theory

Author: Doctors L.J.

Discusser: Yeung R.W.

Question / Comment:

I thought the work of Maria Kirsch (*J. Ship Res.*, 1966) is worthy of inclusion. She computed the Michell's resistance of hulls in shallow water and in a canal. In a recent work of ours (Aubault & Yeung, *J. Mar. Systems & Ocean Technology*, 2012), we studied multi-hull interference in finite depth and noted that there was one case of Kirsch's results that did not agree with ours (for a single hull). Other than that, I thought that it was a remarkable contribution.

Reply:

Thank you for your useful contributions through these two publications, which I will read carefully. The point of interest here, of course, is to compare the exact finite-depth calculations with the predictions from the much simpler shallow-water theory. The latter theory assumes that the water depth is small in comparison with the length of the vessel.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Capture width for arrays of wave energy converters

Author: Farley F.J.M.

Discusser: Evans D.

Question / Comment:

If your formula is correct then a solo Salter duck in an open sea should face downstream for maximum power.

Reply:

The Salter duck is designed to absorb all the incident wave with NO reflection. So it generates nothing backwards $f(\pi) = 0$. It partially blocks the incident wave so less wave goes forwards. $f(0)$ is large and largely cancels the incident wave. So my formula predicts a large CW . If you use $f(\pi)$ in the numerator CW $= 0$.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Capture width for arrays of wave energy converters

Author: Farley F.J.M.

Discusser: Rainey

Question / Comment:

Are you saying Nick's backward-radiation result, your ref. [3], is wrong? According to me (*Phil. Trans. R. Soc.* A370 p. 437 eq. A9) it just looks wrong at first sight. Properly understood (e.g. the Bristol cylinder must rotate backwards) it is correct. And it has a certain style, does it not? Enabling one to deduce performance from still-water behaviour only.

Reply:

Rainey argues quite clearly in his Phil. Trans. paper that the capture width is determined by $f(0)$, but if the motion is reversed then $f(\pi)$ will be required as used by Newman, Evans and others. In the mathematical Wonderland of complex conjugates and time reversal it seems that the backward radiation is important. The theorists need to come back through the Looking Glass and tell us what happens in the real world in which time runs inexorably forwards. Then it is the total wave generated by the presence and motion of the device that interferes with the original wave. And it is the forward emission that determines the capture width. Rainey and I agree. Newman and Evans may agree that their theorem applies only when the motion is reversed.

Discussion sheet

28^TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Capture width for arrays of wave energy converters

Author: Farley F.J.M.

Discusser: Bingham H.B.

Question / Comment:

You conclude that an array of buoys arranged in attenuator mode is less efficient than one arranged in terminator mode. I suspect, however, that were you to include the interactions between buoys, the results, at least for small spacings, would change.

Reply:

A line of buoys as attenuator works. In my Fig. 3 look at the third point on each line, buoy spacing is $kd = 0.4$. For 11 buoys the total C.W. is 2.5 times $\lambda/(2\pi)$, while for 41 buoys with the same spacing CW is 5 times. So adding more buoys in line ahead increases the capture.

My point is that you are not winning. It is better to use 11 or 41 buoys separately.

Your suspicion that it would be better if they interacted may well be correct. Or there might be some cancelation. It will depend on what you mean by interaction... I have not managed to formulate a useful suspicion.

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28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: The wave radiation problem in a two-layer fluid by time-domain method

Authors: Gou Y., Chen X.J., Wang G.B., Teng B., Ning D.Z.

Discusser: Yeung R.W.

Question / Comment:

Thank you for citing the work of Nguyen & Yeung (2011) and recognizing that some earlier computational results were given also in Yeung & Nguyen (1998) in the ONR symposium of that year. I understand that your numerical results of using the Rankine source method were to check the analytical expressions we have derived, and there was no surprises that you found. Am I correct? Besides that, you have confirmed the two papers I mentioned above had provided original results that your work could use as checks. Am I correct? I do not see any new physical results or analytical advancements beyond what we have already published on this interesting problem.

Reply:

The objective to compare with the analytical data is to check my numerical model. The model is only the tool to solve the real problems. So far the validation of the model is the first step I have done. In the future I want to use this model to do some research work as I had mentioned in the presentation such as the hydrodynamic coefficients, the instantaneous problem and so on. But now, the most thing which puzzled me is how to continue it. Because you know well that if I want to give some high quality results and useful results, the numerical model I had used is very limited. So I will think about it deeply. Thank you again for your real statement!

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: On the dispersive modeling of the 2011 Tohoku tsunami generation by coseismic/SMF processes, and near- and far-field impact

Authors: Grilli S., Harris J.C., Kirby J.T., Shi F., Ma G., Masterlark T., Tappin D., Tajalli Bakhsh T.S.

Discusser: Benoit M.

Question / Comment:

Can you give some details on how breaking is taken into account in the FUNWAVE-TVD model when tsunami waves reach the shoreline and run-up during the inundation phase?

Reply:

In FUNWAVE-TVD, there is a breaking criterion based on Froude number and height to depth ratio. When breaking is detected, dispersive terms are turned off in the model and breaking is simulated from the numerical dissipation in the NSW eqs / St-Venant eqs. front tracking scheme (the TVD algorithm). See Shi *et al.* 2012 paper for details.

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Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

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Authors: Grilli S., Harris J.C., Kirby J.T., Shi F., Ma G., Masterlark T., Tappin D., Tajalli Bakhsh T.S.

Discusser: Bingham H.B.

Question / Comment:

1. I assume that the landslide was caused by the original seismic activity?

2. To follow up on Michel's breaking question, what numerical techniques do you apply to keep the solution stable once breaking occurs?

Reply:

1. This is our conclusion. We found a 2 min. delay in the landslide triggering that is consistent with the travel time of seismic waves in the seafloor to the slide location. Slope stability analyses performed with and without seismic loading confirmed this conclusion.

2. FUNWAVE-TVD has breaking criteria based on Froude number and height to depth ratio. Once breaking is detected, dispersive terms in the model are turned off in the breaking region. The TVD scheme follows the breaking front and provides numerical dissipation that closely matches the physical dissipation. This scheme is very accurate for front tracking and does not cause oscillations.

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28th International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: On the dispersive modeling of the 2011 Tohoku tsunami generation by coseismic/SMF processes, and near- and far-field impact

Authors: Grilli S., Harris J.C., Kirby J.T., Shi F., Ma G., Masterlark T., Tappin D., Tajalli Bakhsh T.S.

Discusser: Noblesse F.

Question / Comment:

Could numerical simulations such as those you presented be performed in a systematic manner to predict the results of various offshore earthquakes?

Reply:

This is actually work we are in the process of doing in the US for NOAA's National Tsunami Hazard Mitigation Program. My colleagues and myself are in charge of the US east coast and we simulate both historical cases (e.g. Lisbon 1755) and hypothetical cases, e.g. in Puerto Rico, or collapse of the Cumbra Vieja volcano in the Canary islands, or local underwater landslides. Based on these simulations, we develop inundation and evacuation maps.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A nonlinear calculations of interfacial waves generated by a moving ship and evaluation of the forces in the dead water problem

Author: Grue J.

Discusser: Sturova I.

Question / Comment:

Did you compare your nonlinear results with the results from linear theory?

Reply:

The calculations with a small draught relative to the upper layer depth are relevant to the linear regime, and show that the dead-water resistance behaves like $\alpha_0\ (v_0/h_1)^2$, α_0 a function of the forward speed, v_0 the ship's draught, h_1 the upper layer depth. While the strongly nonlinear calculations of α_0 (which also becomes a nonlinear function of v_0/h_1) show a drag coefficient (of 0.1) experienced by FRAM, linear calculations show zero drag coefficient for the same non-dimensional speed.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A nonlinear calculations of interfacial waves generated by a moving ship and evaluation of the forces in the dead water problem

Author: Grue J.

Discusser: Doctors L.J.

Question / Comment:

Can you clarify the extent of the scientific observations of the dead water problem made onboard the FRAM? Thank you for a fascinating presentation.

Reply:

The detailed observations and descriptions by Nansen are found in Ekman (1904), p. 9 and onwards.

Discussion sheet

28[TH] International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Illustrative applications of the Neumann-Michell theory of ship waves

Authors: Huang F., Li X., Noblesse F., Yang C., Duan W.-Y.

Discusser: Doctors L.J.

Question / Comment:

Thank you for a very illuminating paper. I see that you add the potential flow wave resistance to the ITTC friction formulation in order to obtain the total resistance. Have you considered using a frictional form factor in this work? In my own work, I require a frictional form factor of typically 1.2 to get good correlation with experiments.

Reply:

Thank you for your question. No form factor was used to correct the ITTC friction drag in our results. These results show that a form factor of 1.2 would most likely be too large in our case, in which the wave drag is evaluated using the Neumann-Michell theory (instead of Michell's thin ship theory used in your computations).

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28$^{\text{TH}}$ International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Illustrative applications of the Neumann-Michell theory of ship waves

Authors: Huang F., Li X., Noblesse F., Yang C., Duan W.-Y.

Discusser: Kashiwagi M.

Question / Comment:

In Fig. 2, rather big difference can be observed between the results by two universities despite the same formulation. Nevertheless perfect agreement exists in the trim computation in Fig. 1. The pressure near the stern may influence the trim. How can you explain this sort of contradiction?

Reply:

Thank you for your question. The discrepancy between the numerical results obtained for the wave profiles is due to differences between the ways in which the waves are evaluated in the two calculations. These differences are most important at the free surface plane $z = 0$ and in its vicinity, but are much smaller at a small distance below $z = 0$. This may explain why differences between the numerical predictions of integrated flow properties like the sinkage, trim and drag are much smaller than differences between the wave profiles.

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Illustrative applications of the Neumann-Michell theory of ship waves

Authors: Huang F., Li X., Noblesse F., Yang C., Duan W.-Y.

Discusser: Yeung R.W.

Question / Comment:

Thank you for a nice presentation on the usefulness of the N-K problem and its extensive applications. In the filtering of the results from the numerical solution, my understanding is that this has been applied to the free surface elevation. However, was filtering needed for the potential and its derivatives on the hull surface to obtain wave resistance? Or does one need to filter only the high-frequency components of the amplitude function for this type of N-K problem?

Reply:

Thank you for your question. Filtering of short waves (and numerical smoothing of the tangential velocity) is necessary to obtain realistic solutions to the integro-differential equation that determines the flow potential at the ship hull surface. This filtering is applied at the free surface plane $z = 0$ and in its vicinity. Thus, no appreciable filtering is applied over most of the submerged part of the ship hull surface.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Second-order resonance among an array of two rows of vertical circular cylinders

Authors: Kagemoto H., Murai M., Fujii T.

Discusser: Bingham H.B.

Question / Comment:

You appear to reach conflicting conclusions about the need for adding extra diffusion to the calculations. Can you explain why?

Reply:

The notable differences between the two cases are:

1. Number of cylinders involved in the array: 50 cylinders vs 18 cylinders.
2. Number of rows composing the corresponding arrays: 1 row vs 2 rows.

Considering these differences, after all, I suspect that one plausible explanation may be that, since the number of cylinders involved in the first case is much larger, the trapping is more complete and thus it is more susceptible to the amount of damping.

Discussion sheet

28[TH] INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Time-domain hydro-elastic dynamic analysis of a large floating body including second-order wave loads

Authors: Kang H.Y., Kim M.H.

Discusser: Kashiwagi M.

Question / Comment:

To compute the retardation function (or equivalent load distribution), semi-infinite integrals must be evaluated with respect to the frequency. However it is not so easy to solve the boundary value problem at higher frequencies, especially for large floating bodies. What method did you use and how was the accuracy? Up to what frequency did you compute and did you use some function representation at higher frequencies?

Reply:

Up to this point, maximum 5 rad/sec frequency was calculated and the variation of frequency from 2 rad/sec does not show notable differences for the example 80 m (L) $\times$ 10 m (W) $\times$ 5 m (D). For larger structures (VLFS) need further research. High-order boundary method has been adopted instead of constant panel method. In case of using constant panel method, convergence test along with panel size is indispensable for high accuracy.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Multiple oblique impacts on thin liquid layer with restoring forces

Authors: Khabakhpasheva T.I., Korobkin A.A.

Discusser: Makasyeyev M.

Question / Comment:

The ellipticity means only the shape for body which you considered. Have you studied the effects of changing of center of mass position?

Reply:

No, we considered only the case of homogeneous body. I understand that changing the position of the center of mass will give a different motion of the body. But problem under consideration contains a lot of parameters and, because it is nonlinear, solution will change significantly with even small variation of any parameter.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Hydrodynamic interaction among multiple cylindrical OWC devices restrained in regular waves

Authors: Konispoliatis D.N., Mavrakos S.A.

Discusser: Evans D.V.

Question / Comment:

What are the constraints on the turbine characteristics and how do they affect the power output?

Reply:

The turbine characteristics in q device of an array of N number of OWC devices is equal to:

$$\Lambda^q = g_t^q + \mathrm{i}\,\omega\,(V_a/\gamma \cdot p_a)$$

where V_a, p_a are the air chamber volume in undisturbed conditions and the atmospheric pressure, respectively, and γ is the exponent in the gas law. Here adiabatic compression ($\gamma = 1.4$ for air) has been considered.

The imaginary part of Λ^q may be of some importance in a full scale OWC, but it is ususally negligible in down-scaled laboratory model experiments (Falnes[1]).

The real part of Λ^q can be obtained from:

$$g_t^q = \frac{KD}{\rho_a N}$$

where K is constant for a given turbine geometry (independent of turbine size or rotational speed), D is turbine rotor diameter, N is the rotational speed (radians per unit time) and ρ_a is the atmospheric density.

When g_t^q tends to zero, the duct in each device is assumed firmly closed. While the value of g_t^q increases then the turbine allows more air to pass through it, till we get atmospheric conditions inside the oscillating chamber (open duct case for $g_t^q \gg 0$).

As a result the oscillating inner pressure in each device of the array is proportional to the value of g_t^q, thus the hydrodynamic parameters and the turbine characteristics of each device of the array have to be combined in order to improve the power output.

[1] Falnes J. 2002. Ocean waves and oscillating systems: linear interactions including wave energy extraction. Cambridge University Press.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Dissipation around rolling boxes

Authors: Lu L., Chen X.-B., Teng B., Gou Y., Jiang S., Guo X.

Discusser: Grue J.

Question / Comment:

Please clarify your integration procedure for the free surface motion.

Reply:

The free surface is captured by clear-VOF method together with the ALE frame for the fluid and structure interaction.

Discussion sheet

IWWWFB
International Workshop on Water Waves and Floating Bodies

28th International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Dissipation around rolling boxes

Authors: Lu L., Chen X.-B., Teng B., Gou Y., Jiang S., Guo X.

Discusser: Yeung R.W.

Question / Comment:

Your way of computing energy dissipation is useful, but to what extent can you attribute the dissipation to numerical viscosity? More importantly I do NOT agree with your suggestion in your abstract that effects of roll damping had been considered only empirically. This is incorrect. As early as the 1990's this IWWWFB community had works considering methods incorporating the effects of viscosity with wave effects. Examples of these were: Yeung & Ananthakrishnan (1992, *J. Engng. Math.*), Ananthakrishnan & Yeung (1989, 4th IWWWFB). These and other developments had led to the highly effective mesh-free FSRVM code used now commonly for bilge-keel modeling (IJOPE, 2003, Seah & Yeung) for more than a decade, and other commercial codes of FLUENT and FLOW 3D. In essence you should be more careful with your reference list of works that preceded yours, rather than making claims that you have made a new direction. That was my comment. On a technical point: you showed some results with free surface effects. I am curious how you managed the stress conditions on the free surface. Is it very different from Ananthakrishnan & Yeung (1994, *Wave Motion*) and related works therein?

Reply:

Thanks for your comments and interesting suggestions.

First of all, we would like to highlight our objective in the present work which concerns the detail examination of real fluid dissipation: where and how much. Unlike previous CFD studies in which the examination of dissipation is often ignored, or the dissipation itself is approximated in different manners using discrete vortex, turbulent viscosity, etc, we start with a moderate step on 2D flow at low Reynolds number to which numerical accuracy can be controlled by using the Direct Numerical Simulation (DNS). More realistic flow with high Reynolds number (and 3D) can be studied in the next step. We focus on understanding the basic mechanism of dissipation but not only on the global damping effect, especially to get known where the dissipation takes place and how much energy dissipates.

As you mentioned, the numerical dissipation should be analyzed carefully. Indeed,we have conducted careful examinations with different mesh resolutions and time increments, confirming that the numerical results are free of these effects. It is expected that the numerical dissipation is rather small compared with the physical dissipation. Furthermore, the present numerical calculations are restricted to the cases with low Reynolds number, which allow the two-dimensional DNS to provide results with high numerical accuracy. This is different from your previous work (The references mentioned in your sheet are very useful for us and they should be studied definitely). One available approach to this might be to examine the dissipation rate function in the energy conservation equation, which has received little attention before. As for the widely used DVM method, it might be problematic for the present low Reynolds number although it can work very well for the practical problems with extreme high Reynolds number. But we are not sure if it is available to examine the local dissipation characteristics close to the solid wall. We think also it should be careful to use the FLUENT package to evaluate the practical rolling damping problem at high Reynolds number. For the practical problem, the turbulent dissipation is highly involved. However, the turbulence modeling developed so far remains great challenge, which generally involves approximated model coefficients and wall functions. The "seeming numerical dissipations" are often resulted from the excessive dissipation of the turbulent model which might be much larger than that induced by the Truncation Error in the numerical discretization. That is the reason why we cautiously restrict our numerical studies, at our first step, within the low Reynolds number cases in two dimensional. As for the rolling damping, we state in the abstract "Empirical coefficients associated with the rolling damping are generally required in practical applications". Here the word "generally" doesn't mean that "rolling damping had been considered ONLY empirically" as you mentioned. If any out focus, we are sorry for the misleading.

The potential flows of viscous fluids have been investigated in the Stokes age. However, this topic received scarce attention before. The references listed in the presentation (especially the book by Joseph D, Funada T, Wang J. 2008. Potential Flows of Viscous and Viscoelastic Fluids. Cambridge University Press. Cambridge, UK.) might be useful for whom concerns with this issue. The free surface boundary condition used in this abstract is the same as our previous work (L Lu, L Cheng, B Teng, M Zhao, 2010, Numerical investigation of fluid resonance in two narrow gaps of three identical rectangular structures. Appl. Ocea. Res., 32 (2), 177-190). The numerical model employs the CLEAR-VOF method to capture the free surface. For the simplification, the normal dynamic free surface boundary condition $p = 0$ is implemented together with the necessary velocity extrapolations as suggested by Yang et al. (2006, J. Hydrodynamics Ser. B, 18(3-s1):415-22.) and Lohner et al. (2007, Int. J. for Nume. Meth. in Fluids, 53(8):1315-38.)

Discussion sheet

28^TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Fluid-structure interaction during wave-impact with air-entrapment in a sloshing tank

Authors: Lugni C., Bardazzi A., Faltinsen O.M., Graziani G.

Discusser: Kang H.Y.

Question / Comment:

I'd like to ask two questions:

One is about how to determine the waterdepth as severest case.

And the other is, in addition to your very interesting impact-elastic plate case, have you also conducted the cases with series of impacts so that there may be resonance of the body's elastic deformations?

Reply:

The severest waterdepth was selected from the previous sloshing test with respect to filling ratios. In different configuration of sloshing tank or different initial conditions, the severest filling ratio may get varied.

For test of impact series, the current experiment focused on single impact on rigid/elastic wall and the tests conducted so far have longer periods than natural period of elastic wall.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Time dependent flexural gravity wavemaker problem

Authors: Mohanty S.K. , Mondal R., Sahoo T.

Discusser: Sturova I.

Question / Comment:

What practical problem do you want to solve with using of your results?

Reply:

Asymptotic results for large time and space can be derived using our derived velocity potential for ice covered surface. On the other hand crack problem can also be handled for simple harmonic motion.

Discussion sheet

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28[TH] INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Expansion formula for velocity potential for wave interaction with floating and submerged structures

Authors: Mohapatra S.C., Sahoo T.

Discusser: Korobkin A.

Question / Comment:

Suppose parameters of a floating elastic plate are given. Could you explain how to find characteristics of a submerged plate such that vibrations of the floating plate are minimum?

Reply:

Yes, from the analysis of reflection coefficients, it is seen that the wave reflection attains optimum values for certain intermediate wave period which may be due to phase change of incident and reflected waves leading to constructive/destructive interference of the waves in presence of submerged elastic plate. Thus suitable positioning and configurations of the submerged plate is likely helpful for mitigating structural response of floating elastic plate.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Expansion formula for velocity potential for wave interaction with floating and submerged structures

Authors: Mohapatra S.C., Sahoo T.

Discusser: Meylan M.

Question / Comment:

Do you have a proof about the number of complex roots?

How do you calculate the roots of the dispersion equation?

Reply:

The number of complex roots of the dispersion relation can be located using contour plot.

Using Newton-Raphson method by choosing different initial guess from the contour plot for getting different complex roots.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Current effects on higher harmonic waves

Authors: Ning D.Z., Lin H.-X., Teng B.

Discusser: Bredmose H.

Question / Comment:

Which wave theory is used to provide the incident wave field? For a study of higher harmonics the incident higher harmonics must be a true regular wave solution. One candidate here is the fully nonlinear stream function waves on a current — e.g. see Fenton (1988). Are the results sensitive to the distance between the wavemaker and the cylinder?

Reply:

The second-order Stokes wave theory is used in the input boundary. It is enough for general non breaking waves. There may be dismatch between input boundary and free surface, but less effect in the considered domain.

If reflected waves from object is dealt with well, the distance from wavemaker to cylinder is not a problem. Generally larger than two times the wavelength in our simulation.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Current effects on higher harmonic waves

Authors: Ning D.Z., Lin H.-X., Teng B.

Discusser: Grue J.

Question / Comment:

Your results seem intriguing!

It would be interesting to see results with even higher nonlinearity, illustrating even more strongly the saturation of the second harmonic waves. How far are you able to push your computations, and compare to the even stronger cases published in Grue (1992), which have never before been modelled?

Reply:

Thanks for comments. We would like to continue the numerical simulations with stronger wave cases to illustrate the second harmonics distribution in the coming future, which is hoped to be shown in the next workshop.

Discussion sheet

28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Focused wave impact on a vertical cylinder: Experiment, numerical reproduction and a note on higher harmonics

Authors: Paulsen B.T., Bredmose H., Bingham H.B.

Discusser: Kagemoto H.

Question / Comment:

In figure 2(b), in force spectrum, several peaks appeared almost regularly. The first $2 \sim 3$ peaks may correspond to the peaks that appeared in the elevation spectrum. It is also indicated that the peak at ~ 4 Hz corresponds to the natural frequency of the cylinder oscillation around its root. Then what are the possible cause(s) of the other peaks that appeared between 2 and 4 Hz?

Reply:

The force signal in figure 2a shows a rapid oscillation which starts impulsively after the first main force peak. This oscillation is damped out over approximately 2 seconds. The Fourier transform of an intermittent presence of a sinusoidal signal is given as part of eq. (3) and contains spectral leakage below the vibration frequency in a pattern similar to the Fourier transform of the measured signal.The intermittent presence of oscillation at the natural frequency can therefore cause the harmonics between 2 and 4 Hz.

Discussion sheet

IWWWFB
International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Focused wave impact on a vertical cylinder: Experiment, numerical reproduction and a note on higher harmonics

Authors: Paulsen B.T., Bredmose H., Bingham H.B.

Discusser: Grue J.

Question / Comment:

1. A good data-set with measurements of occurrences of the secondary load cycle in irregular waves, for quite high beta number (of 50 000) (large lab scale) was obtained by Saga Petroleum in the mid 1990s; you may want to compare your simulations with this data-set, which is reproduced with permission, in Grue (2011) *Theor. and Appl. Mech. Lett.* **1** (6), Fig.9. See also Grue & Huseby (2002) *Appl. Ocean Res.* **24**, table 1.

2. The secondary load cycle appears to be much stronger in single wave events in irregular waves, than in periodic waves, where it tends to be rather weak.

Reply:

We are aware of the Saga data shown in Grue and Huseby (2002). We are currently analyzing a new data set, measured at DHI for irregular waves in 2D and 3D. We have seen secondary load cycles for regular waves in our computations and also for irregular waves, but have not yet compared the strength of the secondary load cycles between these two cases. It is an interesting point which we will look into.

Discussion sheet

IWWWFB
International Workshop on Water Waves and Floating Bodies

28th International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Whipping response of a box barge in oblique seas

Authors: Piro D.J., Maki K.J.

Discusser: Bredmose H.

Question / Comment:

Very interesting work!

You mention that the present method iterates on the update on the flexible mode coefficients internally in each time step and then time steps the rigid body modes. Would it be possible to treat rigid and flexible modes simultaneously?

Reply:

Yes it is possible to solve the rigid and flexible modes simultaneously. In fact I am working on this implementation so that I can include an estimated added mass matrix for internal under-relaxation that couples all modes and eliminates the need for explicit under-relaxation. This should reduce the required number of iterations.

Discussion sheet

IWWWFB
International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: A novel connection between the Ursell and Dean vertical barrier potentials

Authors: Porter R., Evans D.V.

Discusser: Kuznetsov N.

Question / Comment:

Reformulating Ursell's and Dean's problems in terms of the corresponding stream functions, one could simplify derivation of connection and illustrate it by plotting stream line patterns.

Reply:

Yes indeed. One could readily approach this in terms of the conjugate stream function and sometimes this can be simpler. Plotting streamlines would certainly add value.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Two-dimensional and three-dimensional simulation of wave interaction with an oscillating wave surge converter

Authors: Rafiee A., Dias F.

Discusser: Scolan Y.-M.

Question / Comment:

It is well known that the choice of the turbulence model depends on the application you consider. Why did you chose the $k - \epsilon$ model?

Reply:

We used the $k - \epsilon$ model because it allows one to use a coarser resolution while capturing the turbulence features compared to other turbulence models like LES (LES requires 80 % of DNS resolution). Having said this (cf Iafrati's comment), it is true that the resolution might still be too coarse for the turbulence model. We also ran the simulations without turbulence and got essentially the same results.

It is not the matter of resolution but the fact, in our opinion, that turbulence is not important in this problem.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Two-dimensional and three-dimensional simulation of wave interaction with an oscillating wave surge converter

Authors: Rafiee A., Dias F.

Discusser: Porter R.

Question / Comment:

In your last sets of results there appears to be a significant difference between the experiments and SPH simulation prior to wave arrival. Shouldn't SPH give zero pressure until wave arrival? (as the experiments show).

Reply:

There is a slight difference in the flap height between simulations and experiments. The pressure sensor locations near the still free surface are sensitive to this small difference.

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IWWWFB
International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Demonstrating the feasibility of a distensible-tube WEC with a distributed power take-off

Authors: Rainey R.C.T., Chaplin J.R.

Discusser: Bredmose H.

Question / Comment:

How would a 500 m long full-scale Anaconda be moored?

Reply:

With a conventional mooring buoy, see discussion at end of paper.

Discussion sheet

IWWWFB International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Demonstrating the feasibility of a distensible-tube WEC with a distributed power take-off

Authors: Rainey R.C.T., Chaplin J.R.

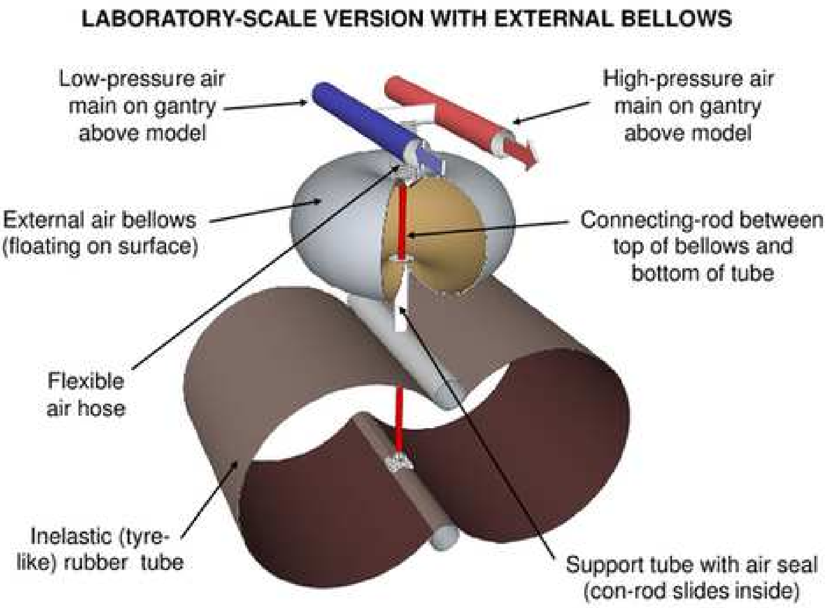
Discusser: Porter R.

Question / Comment:

May I clarify the operation of the alternative version of figure 3 that you showed? The external air bellows have a seal preventing air from entering the main distensible tube, yes?

Reply:

Indeed. See figure below. The idea is that the air pressure is kept low, e.g. 1 meter head static pressure.



Discussion sheet

IWWWFB
International Workshop on Water Waves and Floating Bodies

28th International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Hydrodynamic impact of three-dimensional bodies on waves

Authors: Scolan Y.-M., Korobkin A.A.

Discusser: Bredmose H.

Question / Comment:

An impressive experiment!
Did you look into the influence of waveheight?

Reply:

The experimental data base is unfortunately not large enough to do such a parametric study.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Hydrodynamic impact of three-dimensional bodies on waves

Authors: Scolan Y.-M., Korobkin A.A.

Discusser: Noblesse F.

Question / Comment:

In a situation when Galin's theorem does not apply exactly, can it still be used to obtain approximate results, or does it totally break down?

Reply:

We had the idea to perturb the solution about the elliptic configuration. Then we could provide solutions which are quasi-elliptic. That formulation has not yet been implemented.

Discussion sheet

28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Simplified formulation for parametric roll in regular and irregular waves

Authors: Song K.-H., Kim Y., Park D.-M.

Discusser: Clément A.H.

Question / Comment:

In the work presented here, the roll of the ship seems to be at the same frequency as the waves, allowing to use the concept of RAO, or "transfer function". But I think that parametric roll is sometime at a frequency which is half the wave frequency (or double period). Does your approach apply in that case?

Reply:

This approach is valid for normal roll motion. No restriction is applied. What we did is to solve parametric roll efficiently by using this. Since parametric roll requires nonlinear restoring, this approach will be very applicable to compute nonlinear restoring, so is parametric roll.

Discussion sheet

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International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Wave forces on oscillating horizontal cylinder submerged under non-homogeneous surface

Author: Sturova I.V.

Discusser: Evans D.

Question / Comment:

The main problem here is to find the Green's function. You use eigenfunction expansions but it is possible to obtain an explicit expression using Wiener-Hopf technique. I did this in a similar problem — the Green's function in presence of a submerged semi-infinite dock in a paper in *Proc. Cambridge Philosophical Society* in 1972.

Discussion sheet

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28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Radiation and trapping behaviour of arrays of truncated cylinders

Authors: Wolgamot H., Eatock Taylor R., Taylor P.H.

Discusser: Porter R.

Question / Comment:

Do you know or can you speculate as to the effect on your motion trapping and zero damping when the symmetry of the array is broken either by changing one of the cylinder radius or displacing one cylinder from its symmetric position?

Reply:

We have not performed any analyses of such cases. However, we suspect that (as in your 1997 paper) destroying the symmetry in a case where the trapping behaviour is so strong would greatly reduce the peak effect i.e. the minimum in damping would become much shallower.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Radiation and trapping behaviour of arrays of truncated cylinders

Authors: Wolgamot H., Eatock Taylor R., Taylor P.H.

Discusser: Evans D.

Question / Comment:

1. Does the satisfaction of the inertia condition by increasing the draft affect the frequency of zero damping appreciably?

2. Can you extend to 16 cylinders?

3. A comment: it would be good to see an experimental verification.

Reply:

1. In this case, the initial guess was very good. So the small change in geometry required was associated with a change in ka at minimum damping of only about 0.001.

2. It would be possible to extend to more cylinders. However, in some ways the remarkable feature of this result is that the trapping behaviour occurs for such a simple geometry, i.e. so few cylinders. We suspect that as increasing numbers of cylinders would better approximate an axisymmetric body, trapping would be more complete.

3. We agree!

Discussion sheet

IWWWFB
International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Wave simulation in a 3D coupled numerical and physical wave basin

Authors: Yang Z.W., Bingham H.B., Liu S.X.

Discusser: Lin W.-M.

Question / Comment:

For a problem with inlet in one side only, you need the boundary condition only on the inlet. For a general 3D problem with opening on the sides as well, how do you impose boundary conditions on the sides?

Reply:

Thank you for your question. Actually, it is very difficult to impose boundary conditions on other sides except the wavemaker geometry. But your comments will inspire us to design new types of wavemakers, like "L", "U", "□" shape wavemaker, so that we can impose the boundary condition on the multi-sides of physical wave basin. It should be emphasized that the method presented in this workshop is still available for coupling the numerical and physical 3D wave basin.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: GN equations to describe internal solitary waves in two-layer fluid

Authors: Zhao B.B., Duan W.Y.

Discusser: Noblesse F.

Question / Comment:

Thank you for your interesting paper. Is your method sufficiently efficient computationally that systematic parametric studies could be performed?

Reply:

For the case presented in the workshop, we only need 2 minutes to simulate by using I 7 CPU. We think it is efficient. And we will spend some time on parametric studies in the following work. Thank you!

Discussion sheet

28TH International Workshop on Water Waves and Floating Bodies

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: GN equations to describe internal solitary waves in two-layer fluid

Authors: Zhao B.B., Duan W.Y.

Discusser: Grue J.

Question / Comment:

Congratulations with your good results! I have one warning and one comment:

1. Warning: your model may not represent the dispersion right when short wave effects become important, such as for very large depth-ratio and very large waves, and when waves get very short.

2. Comment: it seems that your generation is somewhat different from the experimental one (but that does not matter much for the solitary waves which always run ahead/away and are self focusing).

Reply:

1. Maybe GN-3-3 theory may not represent the dispersion right, but maybe higher level (GN-5-5) can.

2. Thank you for your comment! It's true! Because we use 5 points smoothing method to avoid wave breaking.

Discussion sheet

IWWWFB
International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Cloaking a circular cylinder in deep water

Authors: Newman J.N.

Discusser: Bingham H.B.

Question / Comment:

Is the drift force you showed that on the central cylinder or the total structure?

Reply:

The drift forces shown in my presentation and in Figure 4 are the force on the total structure. Figure 8 in the abstract shows the separate components acting on the inner cylinder and on the toroid.

Discussion sheet

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Cloaking a circular cylinder in deep water

Authors: Newman J.N.

Discusser: Eatock Taylor R.

Question / Comment:

Have you considered what happens if you remove the inner cylinder?

Reply:

I have only looked briefly at this type of structure. The optimized energy was much larger than for the cases with the inner cylinder.

Discussion sheet

IWWWFB
International Workshop on Water Waves and Floating Bodies

28TH INTERNATIONAL WORKSHOP ON WATER WAVES AND FLOATING BODIES

Domaine de Mousquety, l'Isle sur la Sorgue, 7-10 April 2013

Paper: Cloaking a circular cylinder in deep water

Authors: Newman J.N.

Discusser: Clement A.H.

Question / Comment:

Trying to extend your results to the case where the central cylinder would be freely floating in response to the excitation forces generated by the problem you solve here, I see a kind of paradox because to the far filed you have here (only incident wave field) a radiated wave field would be added due to the motion of the cylinder. Thus, the global energy budget would no longer be correct. Does this paradox imply that the excitation force on the central cylinder vanishes also in the cloaking regime, resulting in a 'no motion' response of the freely floating central cylinder?

Reply:

The case you describe is very interesting but there is no paradox. The exciting force in heave is generally nonzero, although it is real corresponding to the symmetric component of the potential as explained in the text. Similarly the surge force and pitch moment are pure imaginary. If the body is not restrained it will oscillate and radiate waves. Since there is no work done the total energy flux (time average) must be zero, but this includes two equal-and-opposite contributions from (a) the radiated waves only, which is positive, and (b) the cross-term between the incident and radiated waves, which must therefore be negative. These two components are shown separately in Equation 7 of Reference 2.