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Validation case 16

Frequency domain analysis of a floating cylinder

SeaFEM

Version
15.1.0

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November 2018

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1 Frequency domain analysis of a floating cylinder

Problem description

This validation model concerns the analysis of the seakeeping behavior of a freely floating cylinder subjected to the action of monochromatic waves. Actually, the response amplitude operators (RAOs) are obtained using the linear calculation capabilities of SeaFEM (frequency domain analysis). For the sake of validation, the results are compared against those obtained using both the time domain module of SeaFEM and WAMIT.

The floating cylinder characteristics are summarized in the following table.

Cylinder characteristics	
Radius "R" (m)	1
Draft "D" (m)	0.5
XG (m)	0
YG (m)	0
ZG (m)	0
Ixx/Mass (m2)	1
Iyy/Mass (m2)	1

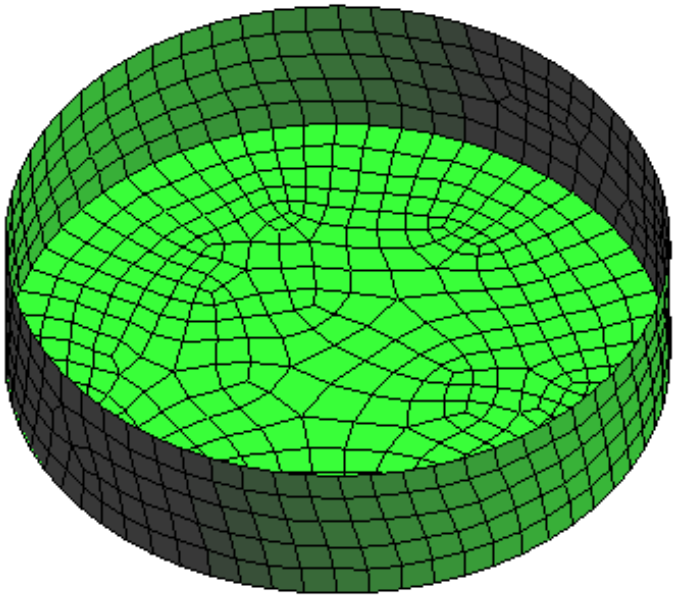
The mass of the body is calculated internally in order to equal the mass of the water displaced by the cylinder.

Mesh

Mesh properties for the present analysis are summarized in the following table:

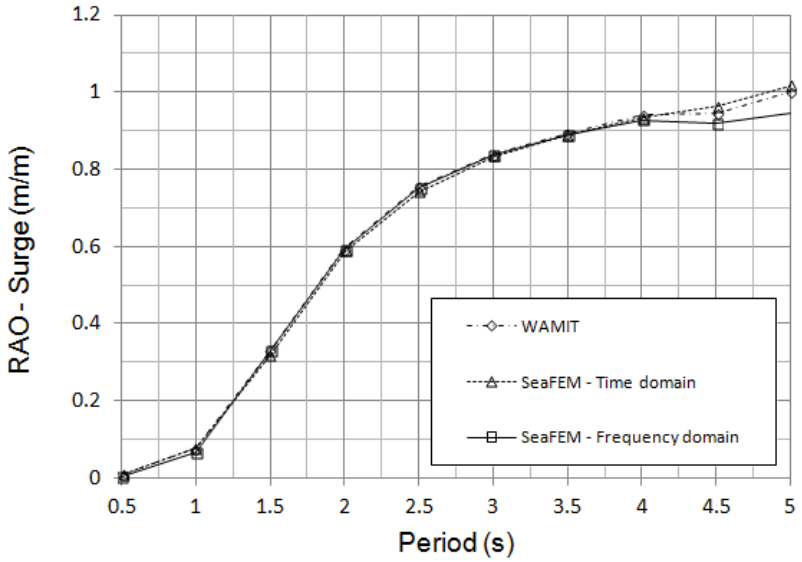
Mesh properties	
Min. element size	0.1
Max element size	0.1
Mesh size transition	0.2
Number of elements	763
Number of nodes	796

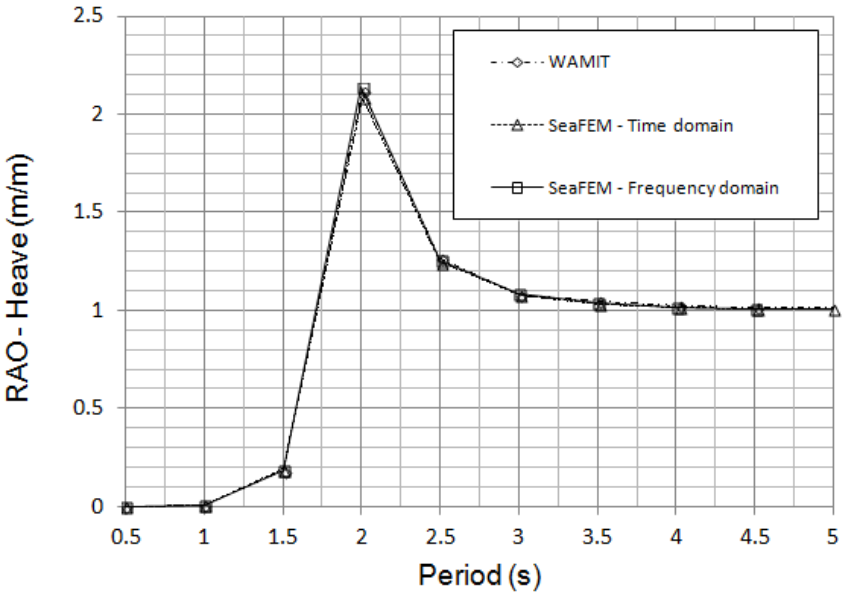
A global view of the resulting mesh is shown in the following figure.

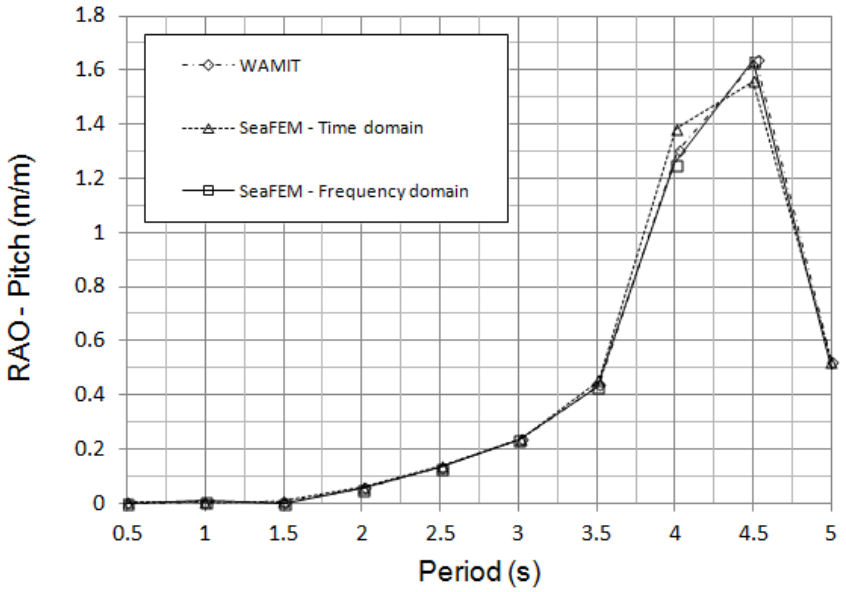


Results

In this section, RAO's results obtained with the frequency domain module of SeaFEM are compared with those obtained with the time domain module and with those provided by WAMIT. In particular, surge, heave and pitch RAOs responses are plotted respectively. From the resulting graphs, it can be observed that the results provided by the various SeaFEM modules and software packages are in very good agreement.




RAO - Heave (m/m)
Period (s)
WAMIT
SeaFEM - Time domain
SeaFEM - Frequency domain
0
0.5
1
1.5
2
2.5
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5


RAO - Pitch (m/m)
Period (s)
WAMIT
SeaFEM - Time domain
SeaFEM - Frequency domain
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

References

[1] SeaFEM - Validation case 4 - Floating cylinder.

Validation Summary

CompassFEM version	15.1.0
Tdyn solver version	15.1.0
RamSeries solver version	15.1.0
Benchmark status	Successfull
Last validation date	27/11/2018