Applications Of Overset Mesh Technique For The Marine Industry

Hans Jørgen Mørch & colleagues at CFD Marine AS

STAR Global Conference 2015
CFD Marine AS

- **Aim:** Be a supplier to the marine industry of services related to CFD, computational fluid dynamics. Contribute to research and new areas of applications for CFD

- 6 employees, of whom 5 do CFD-analysis
- CFD code, STAR-CCM+, 6ps, 900 CPU-core cluster
- Abaqus, FSI, fluid structure interaction
- FRIENDSHIP-Framework, optimization
- AutoHydro, hydrostatics and stability
- SolidWorks, CAD
- Research institution within NFR Skattefunn
Possibilities when using Overset Mesh Technique that we appreciate

- Stationary background mesh, with one or more moving body inside
- Deactivation of overset mesh cells outside domain or between multiple overset grids
- Contact prevention
- Zero gap
Air Supported Vessel
Air Supported Vessel at 30 knots

<table>
<thead>
<tr>
<th></th>
<th>Model test</th>
<th>CFD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure:</td>
<td>435,00</td>
<td>424,25</td>
</tr>
<tr>
<td>Trim:</td>
<td>1,12</td>
<td>0,97</td>
</tr>
<tr>
<td>Resistance:</td>
<td>45,61</td>
<td>45,10</td>
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Social Building on top of Coupled Floating Modules
Roll and Pitch Angles
Forces between modules
Profile comparison

Power output of the Flumill for various profile geometries

Current velocity 3 m/s, rpm 5.5

Legend:
- P_Flumill original
- P_Flumill radical
- P_CFD Marin v1
- P_CFD Marin v2
- P_CFD Marin v3
- P_CFD Marin v4
Solution Time 0.22 (s)
16 m wave with 33 m/s wind
Validation Case: Norsafe GES50 – Flat Water

Model test, Scale 1:4  ∞  Modified aft body  ∞  Full load + 10 t ballast
Validation Case: Comparison of Experiments / Simulation
Validation Case: Effect of Hull Modifications

![Graph showing the comparison of CAR values for different hull modifications at the front and rear.](image-url)
Norsafe GES52 FreeFall Lifeboat Drop height 66.8 m, new world record 03.09.2013
Pitch Rotation Rate
Full Scale Test and CFD Analysis
Pressure probes from full-scale measurements at 44 meter drop compared with the average pressure panel from CFD.
Coupling with structural analysis

Today; One way coupling
- CFD simulations
- Time series of average pressure on hull panels
- Structural analysis
Cosimulation with Abaqus
Cosimulation with Abaqus, cont.