

Analysis of a Water Ride

Motion of the water ride is simulated with VOF method and overset mesh using SC/Tetra

VOF Method and Overset Mesh

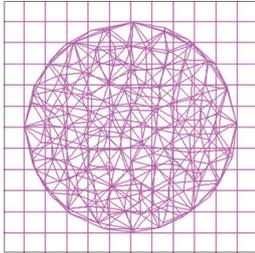


Figure 1: Overset mesh

- In the latest fluid simulation analysis software, a combination of VOF and other analysis functions are used to analyze free surfaces. This enables an analysis of a free surface flow with moving objects.
- Overset mesh (overset grid) is a method to overlay elements of moving region and static region. The program will be simpler and the calculation will be stable because the elements do not need to be regenerated.

Analysis Descriptions

Analysis Model

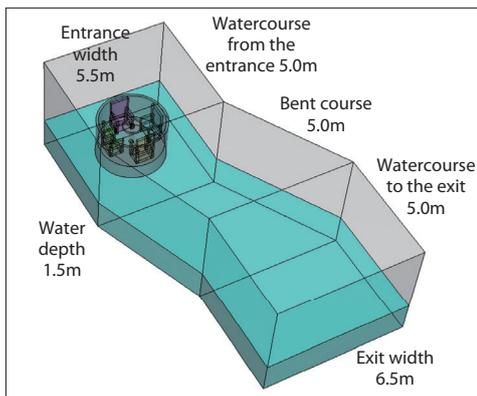


Figure 2: Bent watercourse

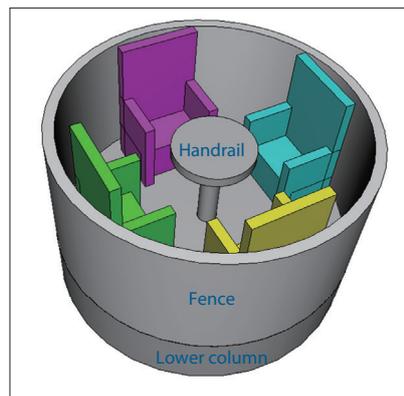


Figure 3: Ride vehicle

Passenger	4 Adults
Seat	4 (86 [kg] each to account for passengers)
Diameter	3 [m]
Density	360 [kg/m ³] (Lower column and fence)
Motion	6 DOF (6 Degree of freedom)

The ride translates and rotates due to the forces exerted by water flow.

Analysis Results

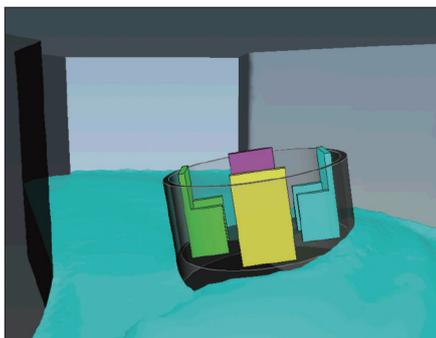


Figure 4: 3 seconds after the ride vehicle went in motion (speed 6 km/h)

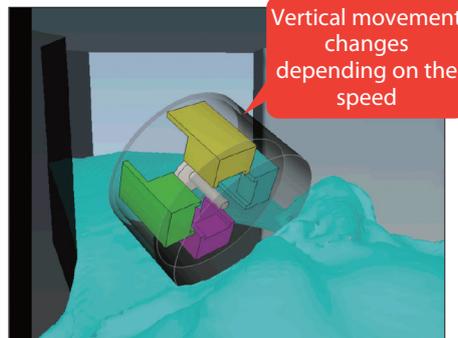


Figure 5: 3 seconds after the ride vehicle went in motion (speed 7 km/h)

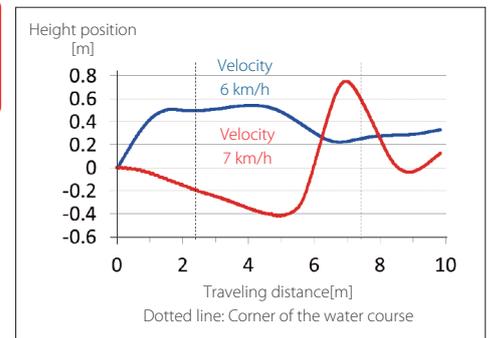


Figure 6: Relation between the height position of the vehicle and the traveling distance

Notes

Figure 4 shows the analysis result of the ride vehicle traveling on the water at 6 [km/h]. The ride vehicle pitches and rolls. Figure 5 shows the analysis result at 7 [km/h]. The vehicle does not capsizes; however, it careens freely and the safety of the passengers cannot be guaranteed. Figure 6 shows the relation between the height of the vehicle on the water and the distance traveled. The height difference is 0.54 [m] after the vehicle travels 10 [m] at 6 [km/h], and it reaches 1.2 [m] at 7 [km/h]. At 6 [km/h], the vehicle strongly pitches and rolls, and 6 [km/h] is sufficient speed to make the water ride fun and exciting.