

# 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

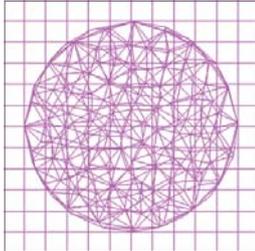


Figure 1: Overset mesh

- 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

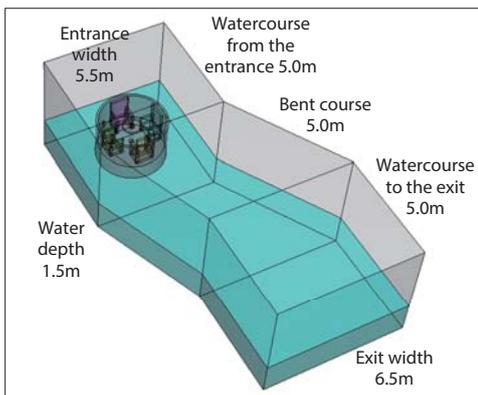


Figure 2: Bent watercourse

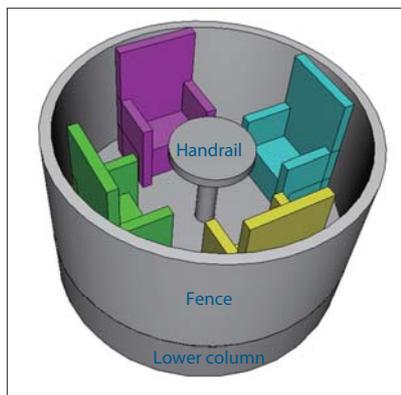


Figure 3: Ride vehicle

Passenger	4 Adults
Seat	4 (86 [kg] each to account for passengers)
Diameter	3 [m]
Density	360 [kg/m <sup>3</sup> ] (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

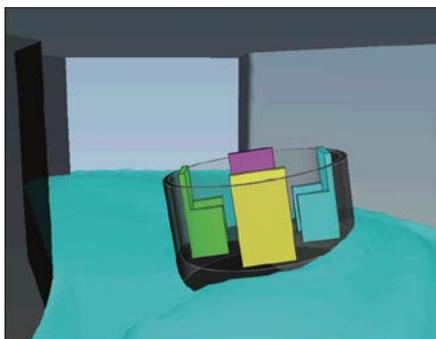


Figure 4: 3 seconds after the ride vehicle went in motion (speed 6 km/h)

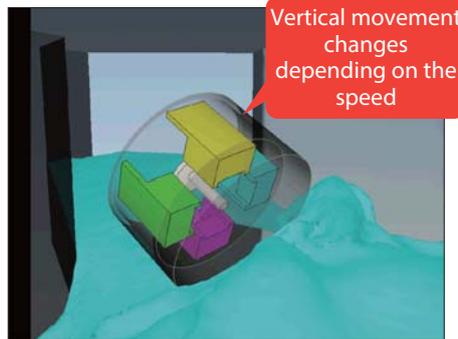


Figure 5: 3 seconds after the ride vehicle went in motion (speed 7 km/h)

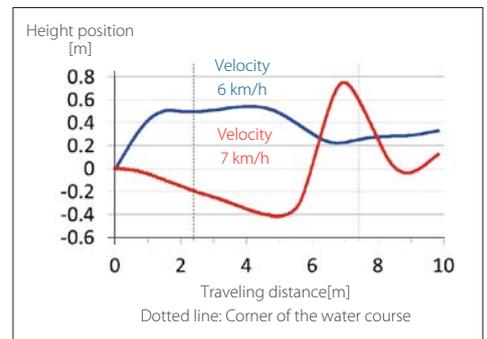


Figure 6: Relation between the height position of the vehicle and the traveling distance

## 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 capsize; 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 to make the water ride fun and exciting.