CFD ANALYSIS OF FLOW AROUND FISH SWIMMING NEAR OR THROUGH WATER SURFACE

Minoru SHIRAZAKI and Kazuma SASAKI

Yokohama National University
79-2 Tokiwadai, Hodogaya-ku, Yokohama 240-8501 JAPAN
shirazak@ynu.ac.jp

Key Words: *Free Surface, Level-Set Method, Fish Swimming, Multiphase Flow.*

This study focuses on the flow around a fish swimming near or through the water surface and aims at discussion on the motion from the viewpoint of fluid dynamics. The authors use the level set method for capturing interface between liquid (water), gas (air) and solid (fish) on the Cartesian grid. The ghost fluid method is used to impose the boundary condition at the solid surface. The drag and the vorticity are computed when the fish swims underwater and jumps through the water surface. The authors discuss about the computational results.

REFERENCES

[1] M. Sussman, P. Smerka and S. Osher, "A level set approach for computing solutions to incompressible two-phase flow, " *J. Comput. Phys.* Vol. 114, (1994), pp. 146-159.

[2] K. Yokoi, "Numerical Method for Interaction Among Multi-particle, Fluid and Arbitrary Shape Structure, " *J. Sci. Comput.* Vol. 46, (2011), pp. 166-181.

[3] R. Fedkiw, T. Aslam, B. Merriman and S. Osher, "A Non-oscillatory Eulerian Approach to Interfaces in Multimaterial Flows (the Ghost Fluid Method), " *J. Comput. Phys.* Vol. 152, (1999), pp. 457-492.
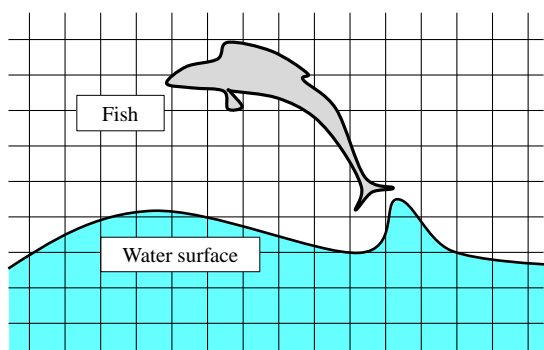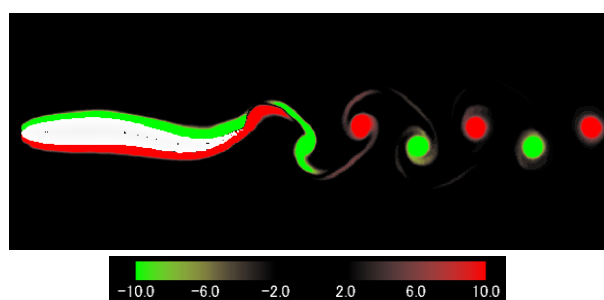
Fig. 1 Conceptual figure of the analysis model

Fig. 2 Vorticity distribution around a deformed fish model