Large scale unsteady simulation of high speed train and ship for performance improvement

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Objectives

In this study, large scale numerical simulations of high-speed train and ship are carried out for achieving their drastic performance improvement. Regarding the high-speed train, aero-acoustic noise simulation from lower part of the train and tunnel micro-pressure wave simulation are carried out for the purpose of clarifying mechanism of the noise and designing the reduction measures. Regarding the ship, unsteady simulations of offshore construction vessel are carried out for estimating the fluid force required in dynamic positioning performance evaluation.

Outline of Results

Regarding the high-speed train, aero-acoustic noise generated from the lower part of the train and tunnel micro-pressure wave propagated from tunnel exit were simulated. Comparing with the result of last year’s study, higher frequency aero-acoustic noise could be evaluated by using new 2nd-order time integration scheme. Also, tunnel micro-pressure wave simulations were carried out by using 12-cars model and realistic geographical model for studying the propagation of the wave. Regarding the ship, navigation and motion performance in wave condition were simulated. As the result, it was confirmed that hull resistance and ship motion could be evaluated accurately by the simulation. However, in order to evaluate the dynamic positioning performance of offshore construction vessel by simulation, more stable numerical scheme should be adopted for achieving the simulating time reduction.