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Accelerating real-time ship motion simulations using general purpose GPU computations

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Software suites for ship simulations are typically used for statistical studies of ship dynamics, but also as a simulator for training ship crew in dangerous situations. One problem that arises during training is speeding-up a part of the session which does not involve actions from the crew. The aim of the study reported here is to accelerate solution of ship motions equations using general purpose computations on GPU. These equations describe dynamics of ship manoeuvring in wavy sea surface, and are central to the simulator programme. The equations are solved numerically via Runge—Kutta—Fehlberg method. Due to high number of floating point operations, computation on GPU achieves considerable speed-up over CPU. High performance solution allows to shorten training sessions and make them more efficient, but also beneficial for statistical studies as it reduces simulation time.

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