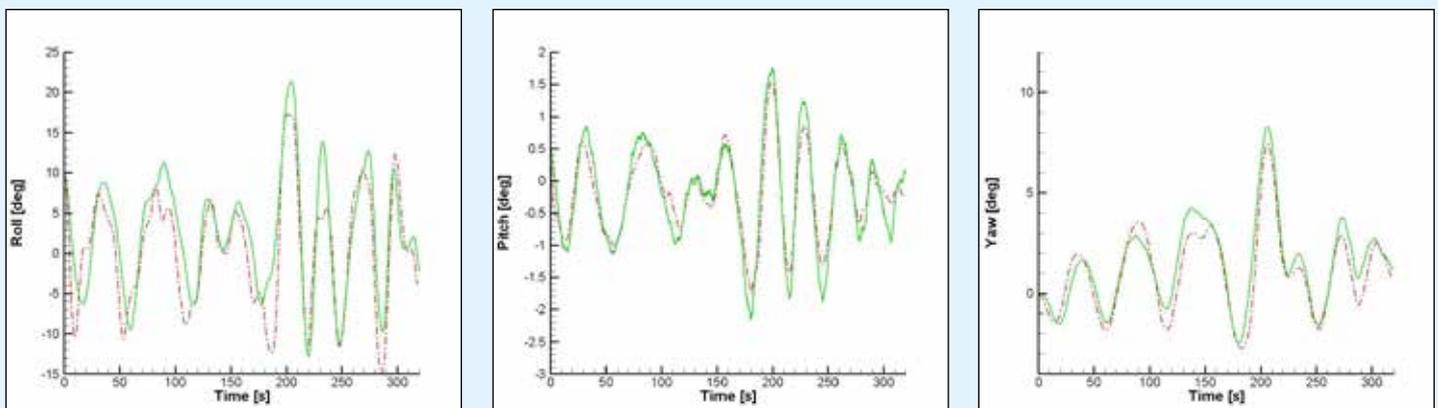


Cooperative Research Navies tackles dynamic stability

Over the last 25 years Cooperative Research Navies (CRN) has largely focused on the prediction and validation of extreme motions and capsize risk assessment through the use of the FREDYN simulation program.



The current stability standards in use by many navies and coastguards are predominantly empirical and were mainly developed during and soon after World War II. Developments in commercial ship stability must be evaluated to ascertain if they are applicable to naval combatant design, and if so, to outline a suitable approach reflecting the risks of the naval combatant environment.

Capsize sensitivity is subject to several parameters including hull geometry, loading condition, size, heading, speed and seaway. Ship-specific, operator guidance has therefore been recognised as required to avoid potentially hazardous conditions.

Over the years FREDYN has been developed for both performing fast simulations in sensitivity studies with parameter variations, as well as real-time simulation for use in a bridge simulator.

quartering seas. The plots highlight a comparison between the simulated and experimental roll, pitch and yaw motions in steep SS 5 waves at a 24-knot speed.

Dynamic stability is still a complex issue, but good progress in understanding it has been made over the years and is flowing into the second generation intact stability regulations currently under development at the IMO. This development will provide support to both commercial shipping and to navies. Nevertheless, the new stability regulations call for 'level 3' direct stability assessment methods, in case a vessel fails the simplified level 1 and 2 criteria.

FREDYN is currently undergoing a major update incorporating the newest insights and computational approaches into the existing code base, making it fully ready to be used as an up-to-date, validated and proven tool for capsize risk assessment and extreme sea-keeping behaviour prediction. ▢

Frans Kremer
fkremer@marin.nl

The figure shows an example of deterministic validation for a destroyer sailing in stern