03-004945

Multiple POD propulsion.

Ship resistance, pro

Hot of the press, Report takes a look at just a few of the recent subjects tackled by the associated CRS working groups.

Patrick Fitzsimmons, LRS &
Gert Kuiper
G.Kuiper@marin.nl

Ship resistance and propulsion problems often develop with the ship types that are being built. A considerable amount of work has been done in the last decade for cruise ships, where silent running of the ship and propeller is paramount. As well as this, the increasing power and speed of containerships have created serious erosion and vibration problems.

POD application has also raised new questions and problems and this has been and still remains, the focus of a working group actively supported by yards and operators. Navies have also contributed much to the investigation of cavitation.

The PIF (Propeller Inflow) working group provided members with methods to predict the propeller inflow at ship-scale, for a range of hull shapes. CFD methods were used extensively to develop practical scaling algorithms and this inflow is the basis for the design of the propeller.

Propeller design tools under development

Tools for propeller design are under development developed using numerical methods (potential flow codes). Such a tool predicts the periodic flow around the propeller blades, from which the propeller loading, shaft torque and moments etc., can be derived. This code also contains a module for the prediction of cavitation. The non-cavitating code is under extensive evaluation against comprehensive model data. These cavitation modules will be evaluated in 2005. Such calculations are important since cavity dynamics are the source of pressure fluctuations on the hull.

The behaviour of cavitation on a propeller behind a ship is very complicated and has to be verified experimentally, at model-scale. Experiments with a range of typical cavitation types have been carried out by the working group on pressure pulses (PRES), where induced pressures were measured simultaneously with high-speed video observations of the cavity dynamics. The combined data reveals much of the mechanisms which generate the pressure fluctuations leading to noise and vibration on the ship. This research is used to improve the analysis of model data and the calculations.

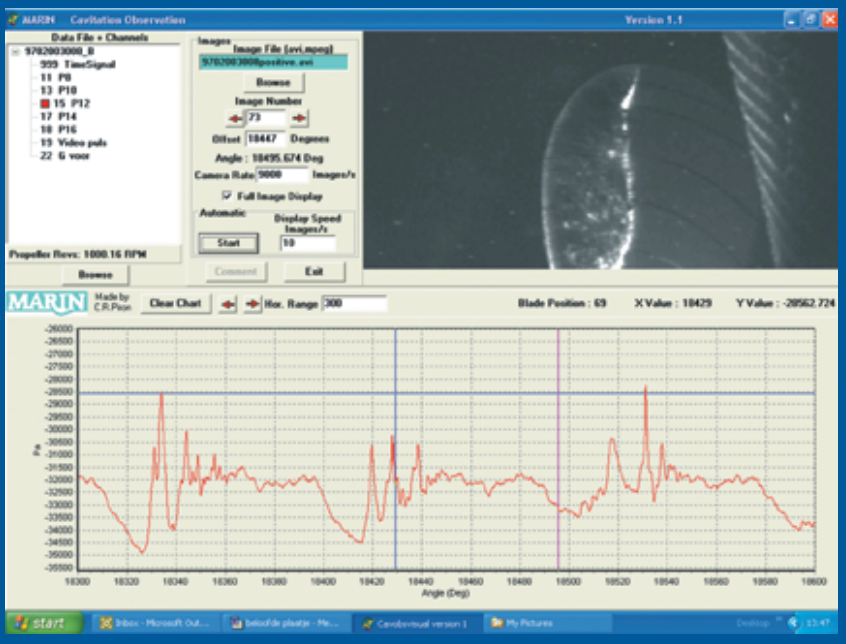
cavitating propeller. Such a program, PROCAL, is now being developed. This panel code, being done in the PROCAL working group, calculates the unsteady flow over the propeller blades in a given wake flow, while a cavitation model is used to predict the oscillating pressures on the hull.

As can be seen from the brief outline of just some of the research undertaken by the various working groups, CRS is active in many fields. New innovative designs and propulsion systems are continually under investigation and the quest for knowledge never disappears. MARIN

pulsion and PODs

PODs

POD propulsion is new and there is little available experience in the optimisation of the propulsion system. Investigations into the optimum location and configuration have been carried out by the POD working group. An example is the application of multi-pod systems. The application of PODs opens new possibilities for the shape of the aftbody. Investigations on the hull form showed that significant gains were possible by reducing the wave resistance of the aftbody. Ship lines with reduced wave resistance (wave damping aftbody) were developed within CRS. Calculation programs to estimate wave resistance are typically commercially available, as well as being available to CRS members. These programs have been evaluated thoroughly within CRS. Where no programs are available, they can also be developed within CRS.



Simultaneous recordings of cavitation (9,000 frames per second) and hull pressures.

PROCAL

CRS aims to have a reliable tool for the prediction of pressure fluctuations on the hull, due to a