New trends in navigation tools

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State-of-the-art navigation tools

Radar is the eye of the skipper
State-of-the-art navigation tools

- radar
- rate of turn indicator
- autopilot
- VHF
- chart viewer

(Inland-ECDIS information system)
Recent navigation tools

Inland-ECDIS navigation systems

Inland-AIS transponder
Common radar problems

Inland navigation:
one radar antenna at the bow
one radar antenna at the stern

but radar image not always unequivocal
Common radar problems

False radar echoes

Distance and size of an object measured by radar

Display of radar image with vessels at the according site
Common radar problems

Basic Problem 1: False radar echoes

Distance and size of an object measured by radar

Display of radar image with vessels at the according site

multiple reflexion occurs

→ additional false echo
Common radar problems

Example

Correct echo

False echoes
Common radar problems

False radar echoes may arise, e.g.

- when two vessels pass by simultaneously at a certain angle

- by multiple reflexion of the radar beam within the hopper well when traveling empty
Common radar problems

Example

radiator at the bow

False echo caused by radar reflexion within the hopper well
Common radar problems

Shading effects

- Load as high as the radar scanner at the stern
- Container causes large shaded area in front of the vessel
Solution: Multi Radar Image

- two radar scanner
- bow radar provides clear image in front of vessel
- combination of both radar images
- false echoes can be distinguished from correct echoes because they are not confirmed by the other radar
Multi Radar Image

Overlay of both radar images:

- Display of images separated by a dividing line
- Elimination of false echoes caused by own vessel
- Elimination of shading effects
Multi Radar Image

Overlay of both radar images:

- overlap of masked images of bow and stern radar
- echo thicker when present in both radar images
- echo thinner when present only in one of both radar images
- reduces false echoes
Multi Radar Image - System

Solution 1: integration of second radar image
Multi Radar Image - System

Solution 2: fully redundant system
RADAR pilot 720° with large screen

55 cm
Navigation on narrow waterways
Navigation on narrow waterways

- narrow river
- bended section
- large vessel

⇒ Selection of area of encounters desirable
⇒ Foresight essential
Navigation on narrow waterways

Level reach of river Main
Navigation on narrow waterways

Level reach of river Main

Sections to avoid encounters

AIS provides information about ships behind the bend
Navigation with large ships on narrow waterways

navigation display: range 300m

navigation display: range 800m
Navigation with large ships on narrow waterways

**Problem:** simultaneous display of short and long range area showing navigation tasks coming up and exact current navigation situation

**Solution:** additional indication of the long range area as simple bar along the river chart providing the most important information
Important objects in RADAR

Display objects relevant for navigation as

- bridges
- locks
- ferries

in front of the own vessel
Important objects in RADARpilot 720°

Mouse cursor above the bar shows the symbol
Important objects in **RADAR pilot 720°**

Detailed information in the context menu
Important objects in RADARpilot 720°

With AIS:
- path-position diagram for vessels
  - going downstream
  - going upstream
Conclusion

• new navigation functions for Inland ECDIS applications as multi radar and look ahead
• combing two radars in one display enhances the overall radar presentation and interpretation
• combination of short range and long range display advantageous for proper tactical navigation
• in future, application possible for traffic coordination, especially upcoming traffic on difficult river reaches
Thank you for your attention