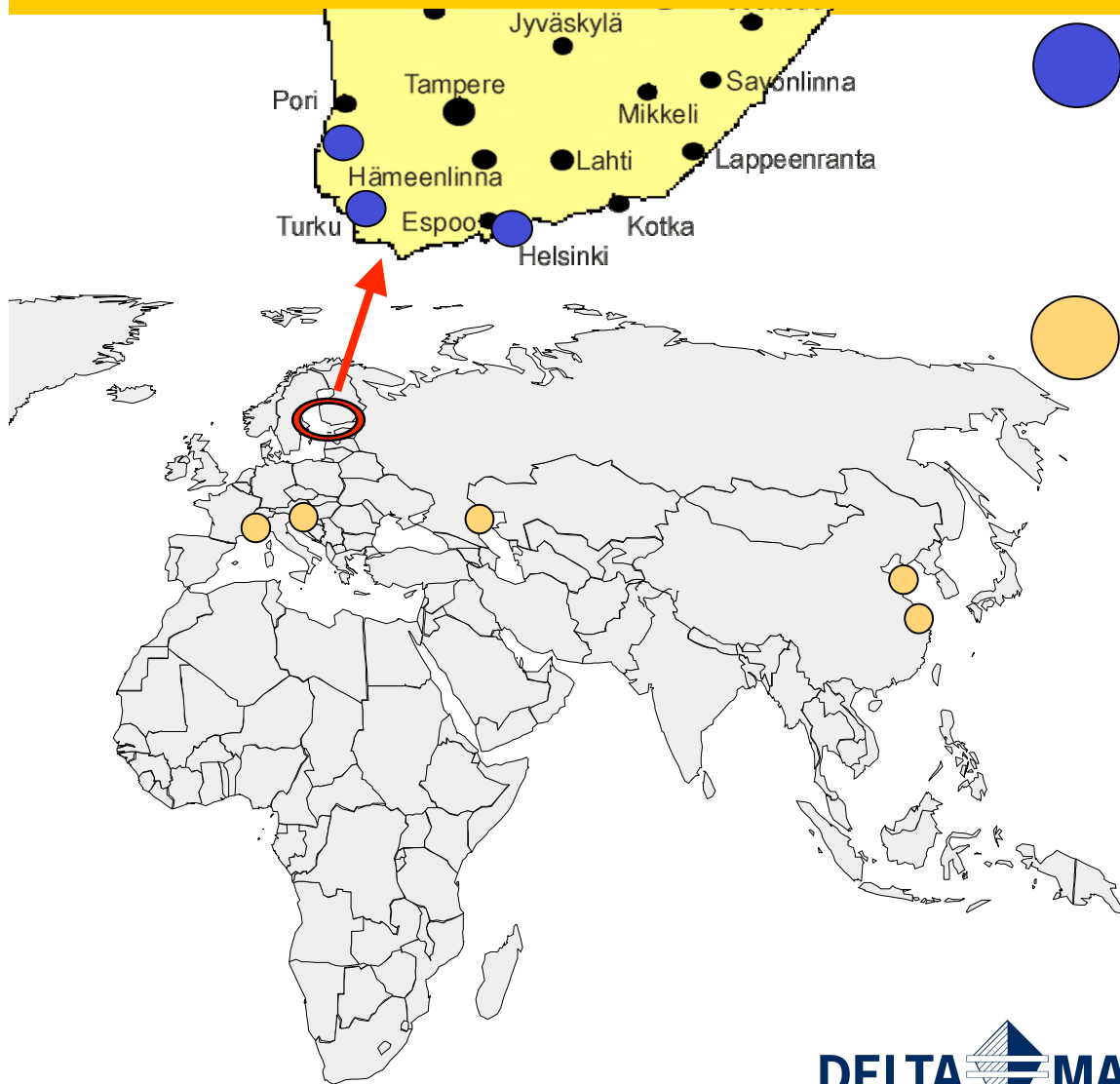


# CFD in Ship Design

Juha Hanhinen



# COMPANY INFORMATION



## OFFICES IN FINLAND:

Raisio (Head Office)  
Helsinki  
Rauma

## OTHER COMPANIES IN THE GROUP:

Delta-Astra, Finland (50%)  
Brodoplan d.o.o., Croatia (50%)  
Astramarin, Russia  
(65% by Delta-Astra)  
Shandong Deltamarin (50%)  
Representative office in Shanghai  
V.Delta, Monaco (50%)

# PERSONNEL 01/2007

Deltamarin	183
Deltamarin Contracting	69
Delta-Sigma	6
Astramarin	69
Brodoplan	45
Shandong Deltamarin	30
Rep. office in Shanghai	2
<b>TOTAL</b>	<b>404</b>

# History of CFD in Ship Design

- Commercial calculations started late –80's, model test institutes started offer cfd-service for pre-optimizing hull geometry prior the testing
- First programs were based on linear potential flow theory

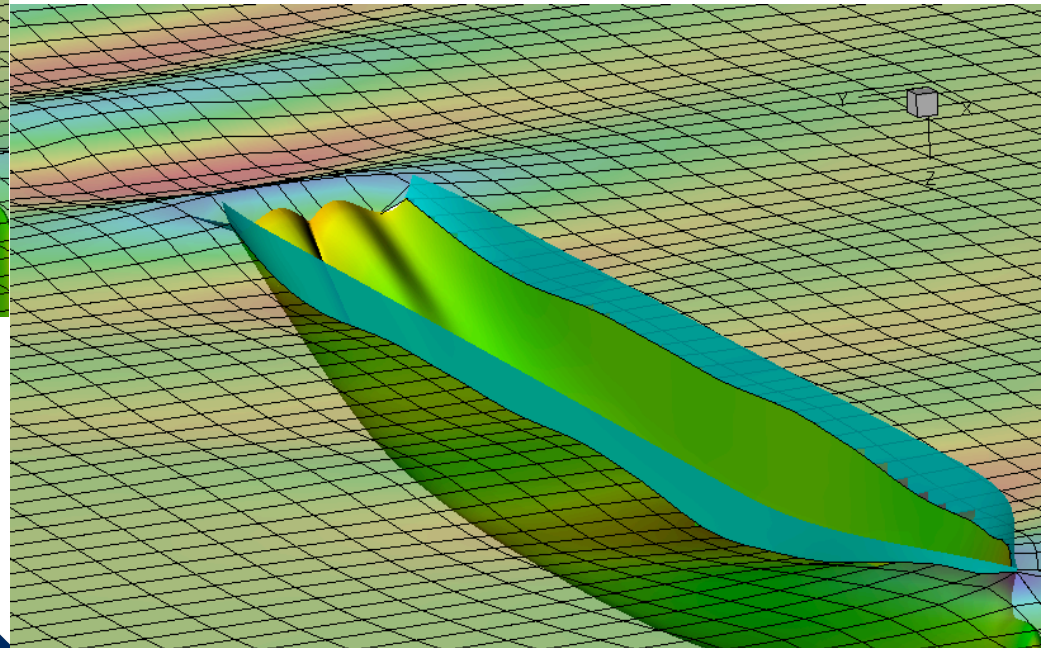
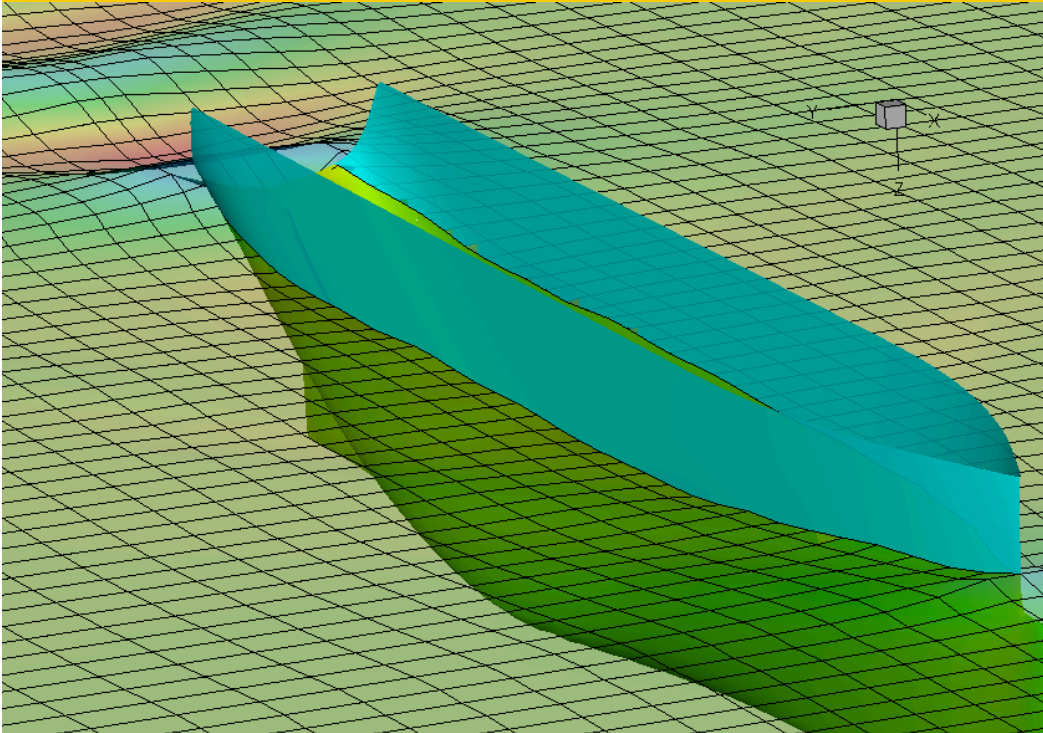
# DM CFD Background

- DM involved with Finflo-Ship development almost from the beginning (-96)
- DM acquired its first cfd-program (Shallo from HSVA) in 1997

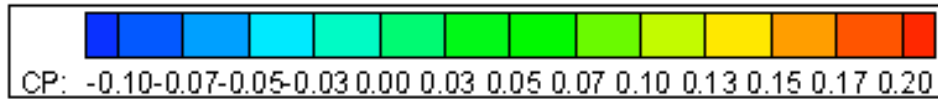
# CFD @ DM Today

- Two cfd-licenses in daily use, 25...30 hull geometry designs every year
- Program  $\nu$ -Shallo (HSVA 2003), based on non-linear potential flow theory
- DM subcontracts RANSE-calculations

# Surface Wave Patterns

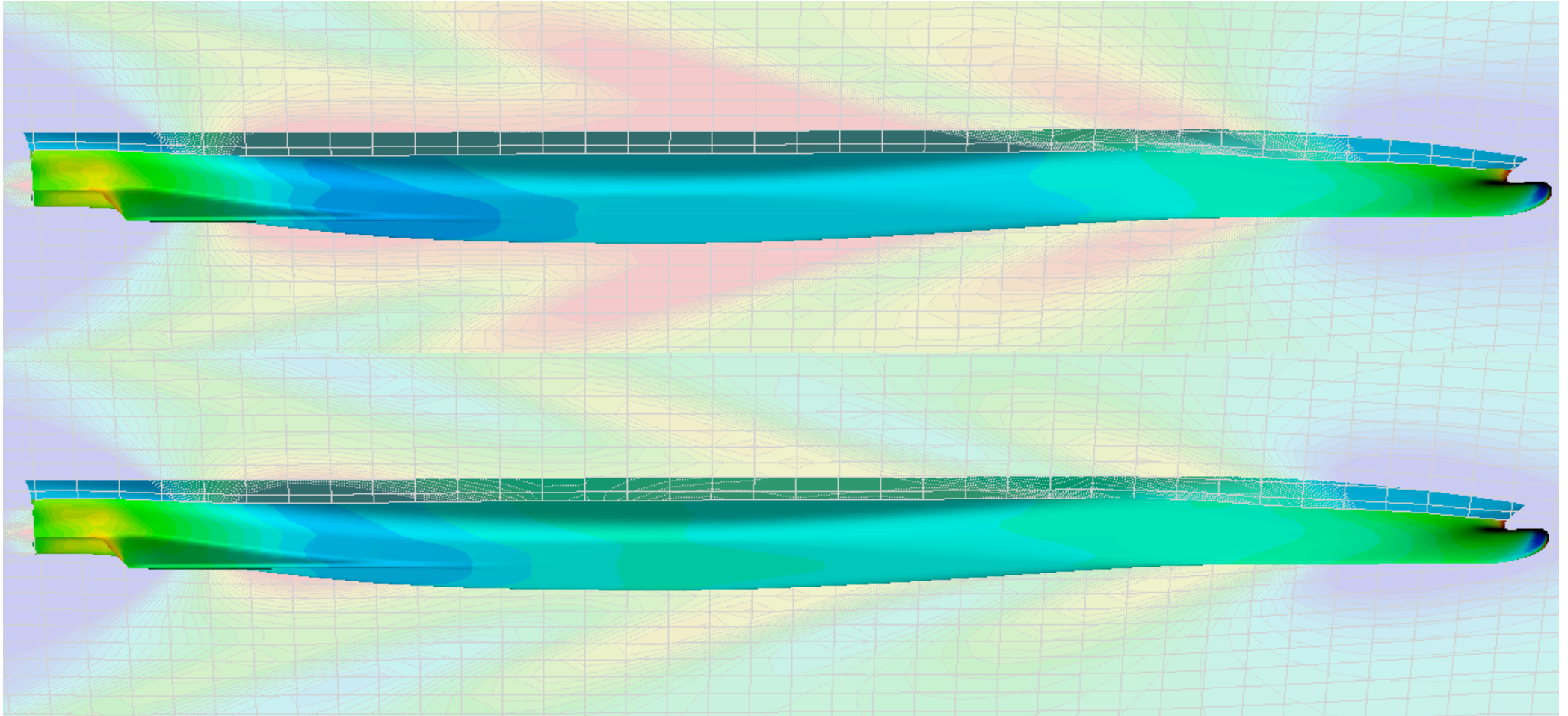


# Bulb Geometry Optimization

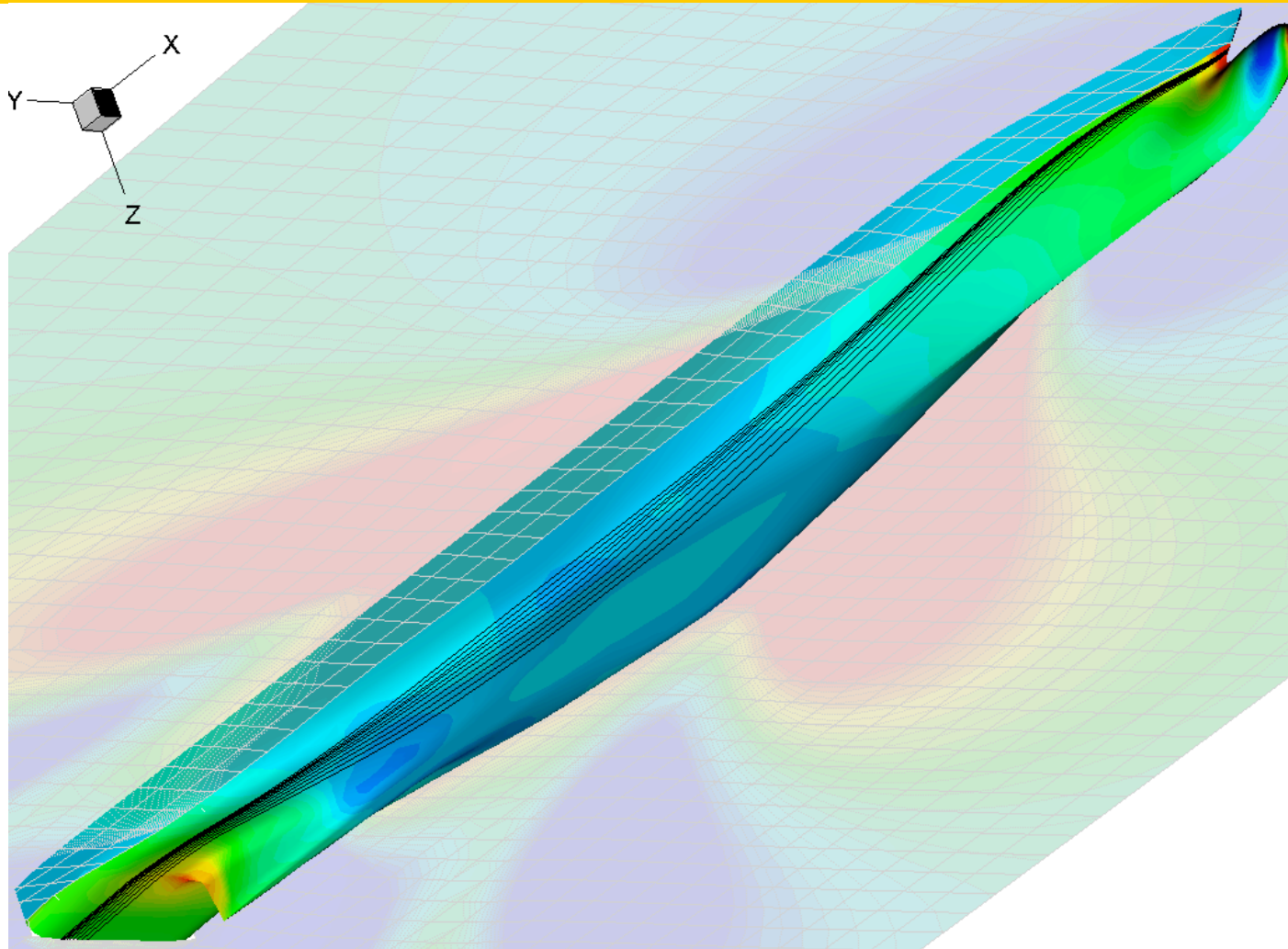




# Shallow Water Effect



# Flow Lines



# Near Future

- RANSE codes already in commercial use in model test institutes
- RANSE codes are soon coming to engineering use (latest TEKES funded Finflo-proj. just finished)
- Free surface boundary condition traditionally been problem for viscose-flow solvers

# Top Priorities

- Accurate propeller-hull interaction
- Accurate powering performance calculation
- Faster iteration times/more powerful computers
- Faster/more automatic grid generation

# Distant Future Needs

- Complete ship behavior simulation; Maneuvering, seakeeping...
- End of physical scale model testing