

# Numerical Analysis and HPC

## a research group at Department of Applied Mathematics

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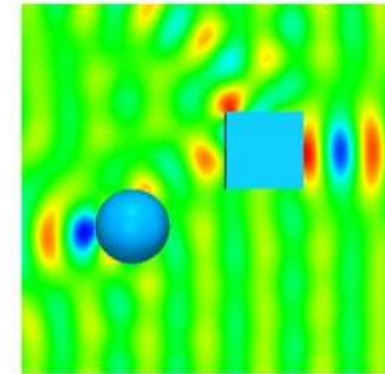
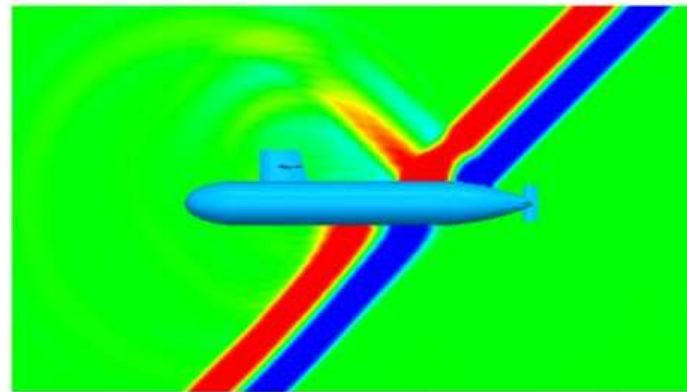
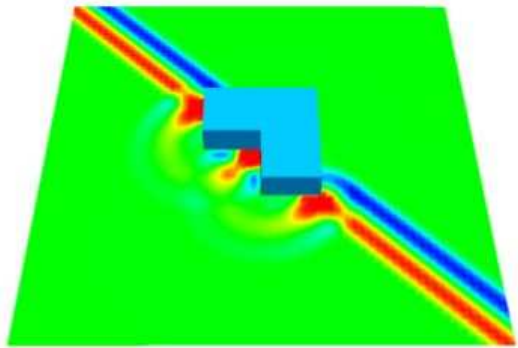
DEPARTMENT  
OF APPLIED  
MATHEMATICS

# Industrial problem $\rightsquigarrow$ mathematics $\rightsquigarrow$ HPC solution

## Software development, applications

- Physics: contact mechanics, electromagnetism, acoustics, molecular simulations
- HPC software: permon.vsb.cz (parallel FETI, QP algorithms), BEM4I/ngsolve.org (parallel BEM), GPU-BEM library
- Industrial projects: Honeywell (SHM), Continental (ultrasonic acoustics), Fraunhofer Chemnitz (electromagnetic forming)

## Example: 3d wave equation, space-time discretization

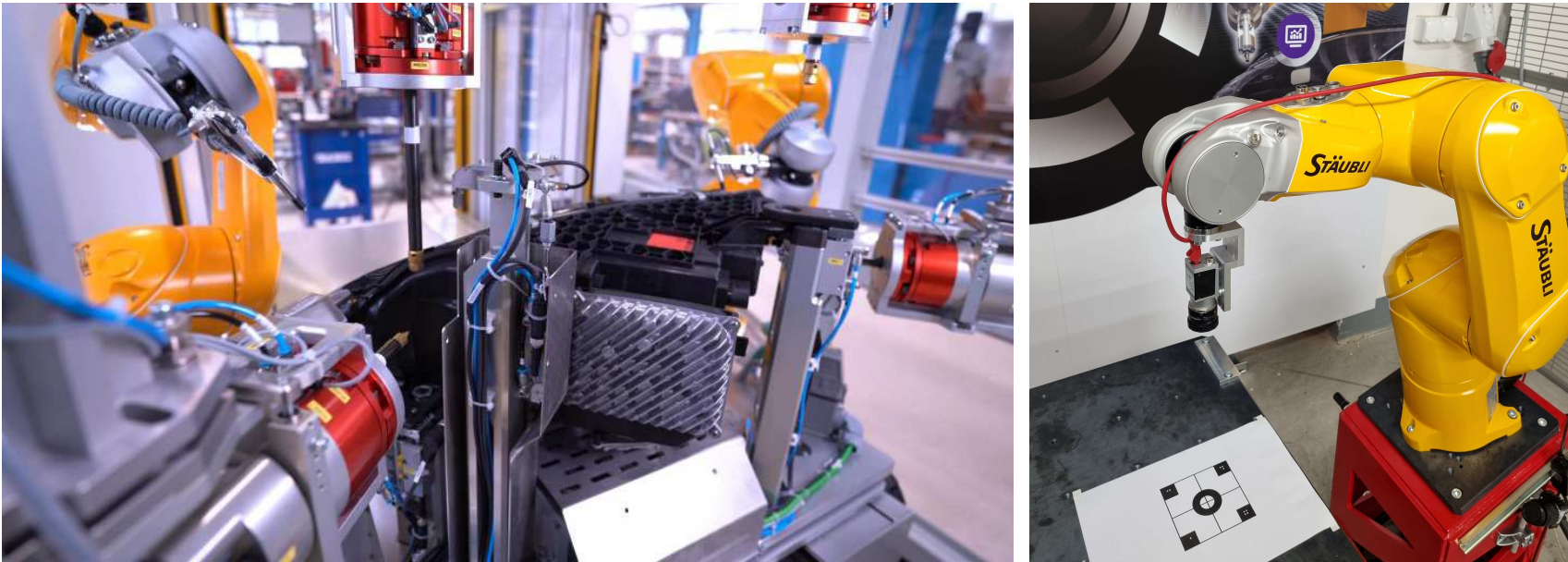


**Collaboration challenge: Real-time embedded software development**

**Industrial problem  $\rightsquigarrow$  mathematics  $\rightsquigarrow$  HPC solution**

## **Industrial optimization**

- Optimization of product adjustment and industrial camera calibration



- Collaboration with Department of Cybernetics and companies ELVAC, VARROC

**Collaboration challenge: Software development for industrial robotics**