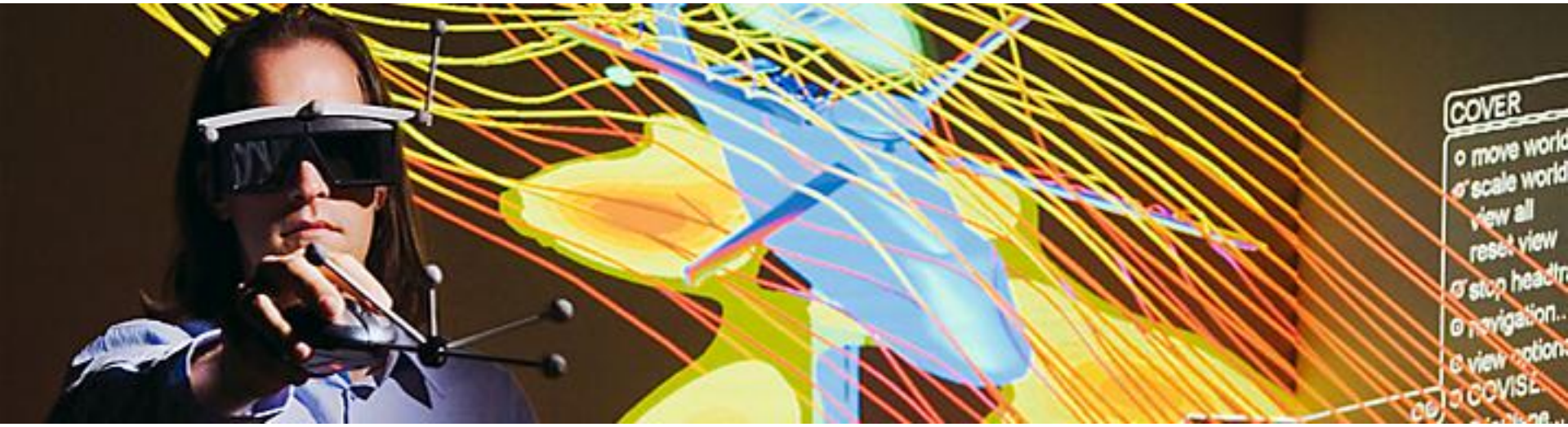
Industry's Contribution to GHG Emission Savings: Energy Efficient Design of new Methods & Materials

Peter W. Haas, GCERM



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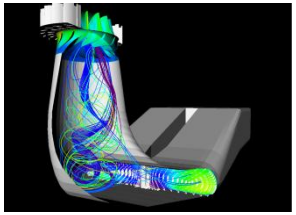
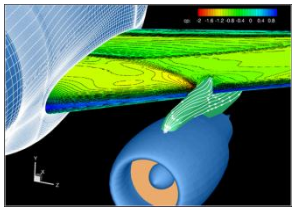
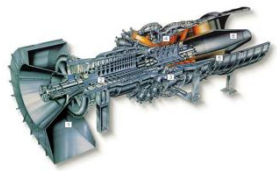
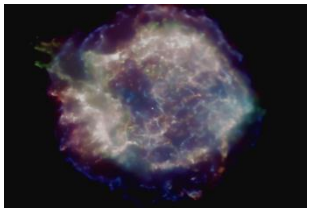
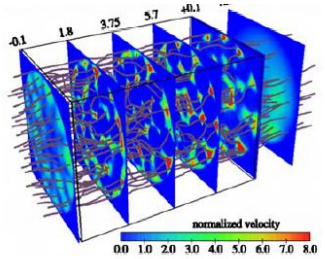


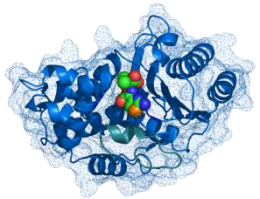


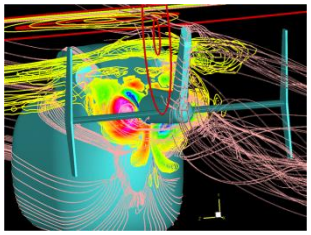




- Aeroacoustics
- Aerodynamics
- Astrophysics
- Bioinformatics
- Combustion
- Fluid-Structure Interaction
- Helicopter Aerodynamics
- Meteorology
- Molecular Mechanics
- Nanotechnology
- Solid State Physics
- Turbo Machinery
- Turbulence Phenomena

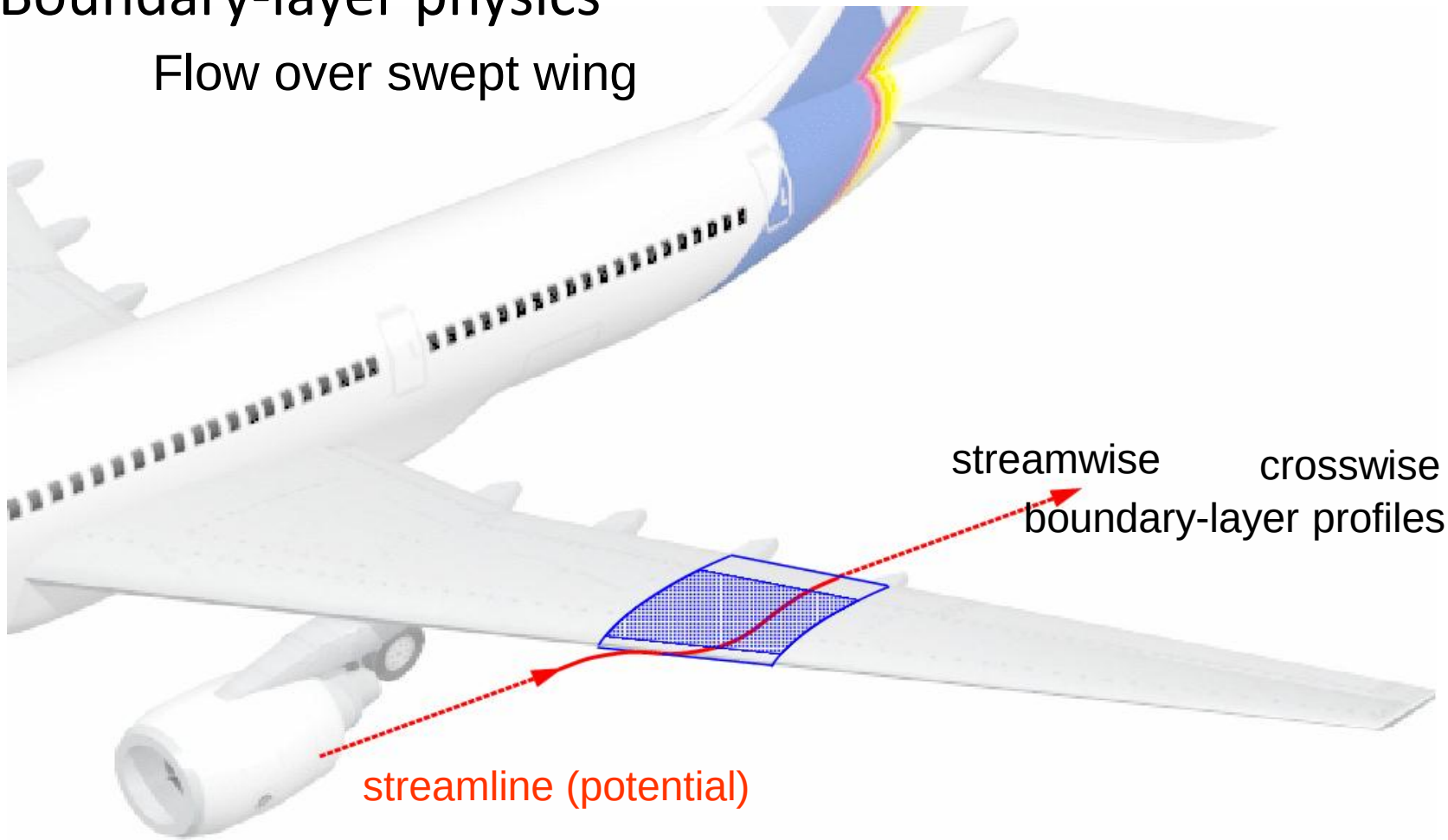






Boundary-layer physics

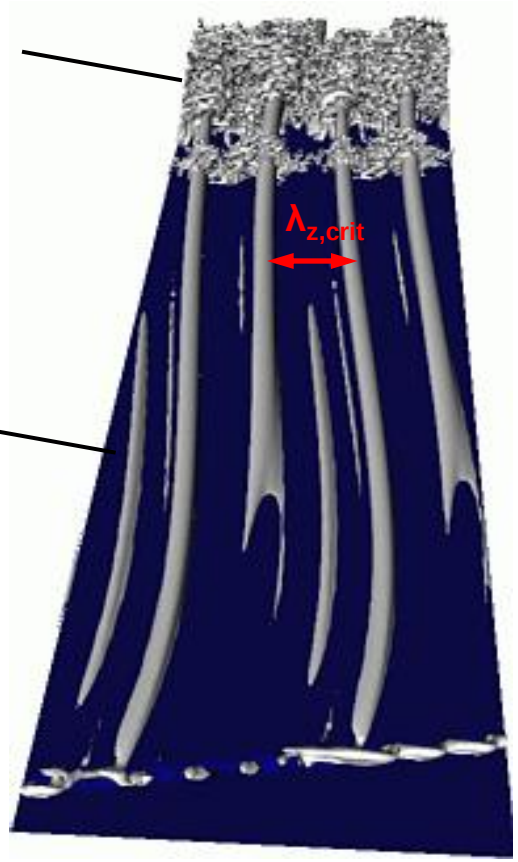
Flow over swept wing



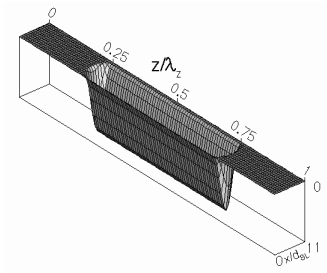
Laminar Flow Control

Transition

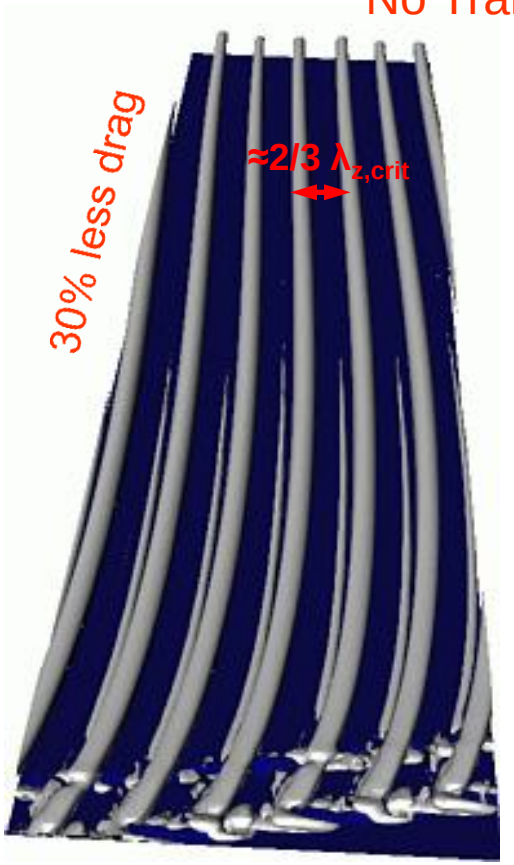
“natural”



380 Mio Grid Points, 25 cm in streamwise direction



No Transition



„Natural“ scenario

With excitation of closer-spaced vortices upstream

US President Obama on Biofuels

Fuel Efficiency 2.5l/100km Full Size Car

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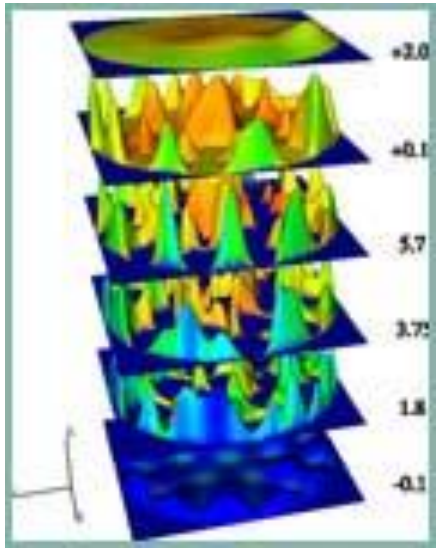
Project BEST

- LSTM, RRZE University Erlangen
- HLRS, University of Stuttgart
- CFD (Lattice Boltzmann Method)
- Applications: Direct Numerical Simulation, Chemical Engineering



- 2D/3D incompressible flow solver for Newtonian fluids on structures grids
- Lattice Boltzmann Model: D2Q9/D3Q15/D3Q19
- Large-Eddy Turbulence Model
- Chemical Surface Reactions
- Diffusion
- Internal Combustion

Doha Museum of Islamic Art

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Creative Freedom

At this same time glassware of limited form and colour was being made in Europe, the glassmakers of the Islamic world were developing new methodologies, resurrecting techniques unused for centuries, and experimenting with theory and colour. They economically dominated the field with its industrial output of thousands of tonnes of raw and finished materials for local and international markets, highly valued and desired.

Virtual Engineering of a New MMC City

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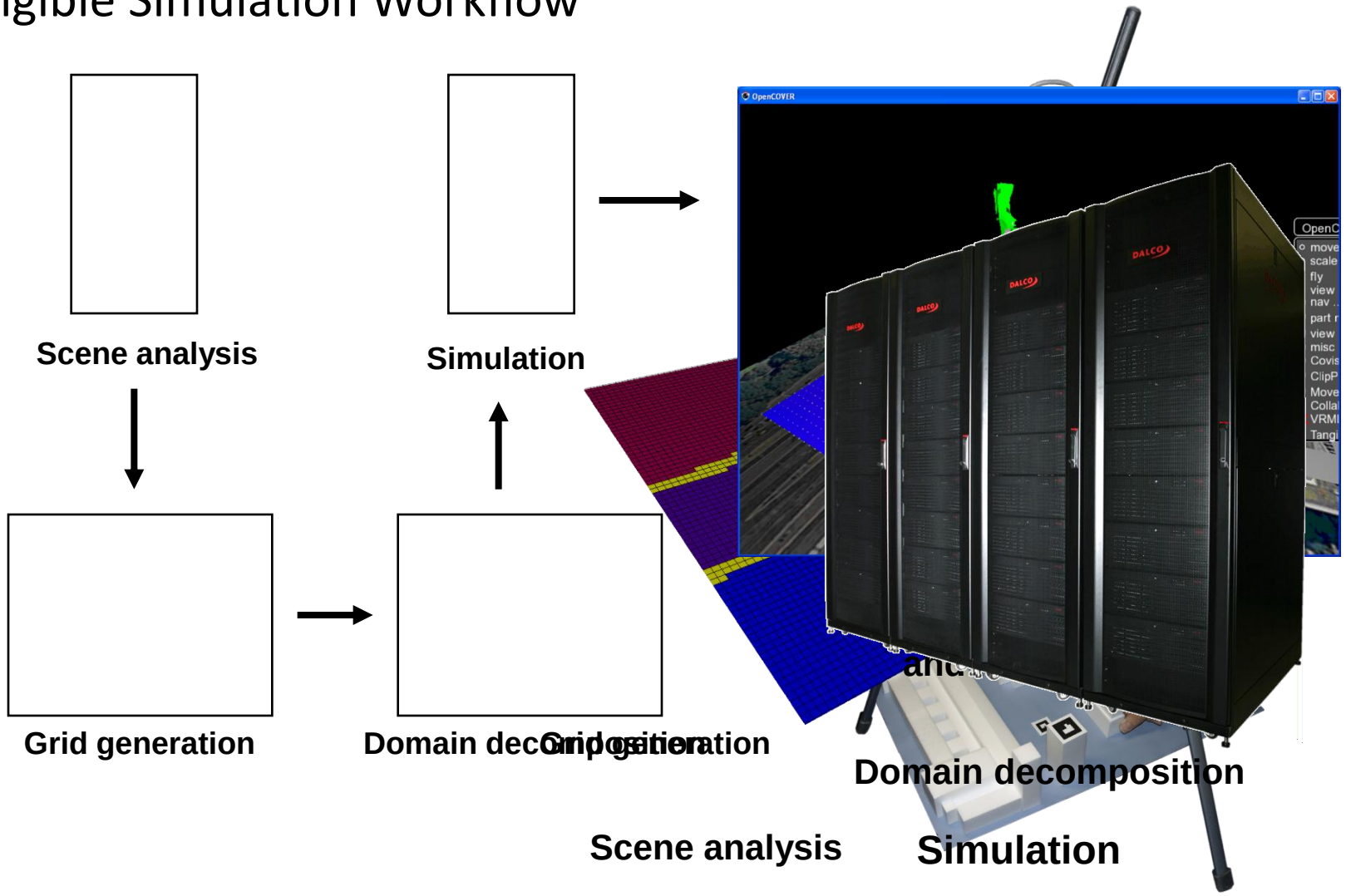
Tangible Simulation Workflow



Thank You!

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