ExMuST – Comprehensive Experimental Database for Unsteady Multi-Stage Turbomachinery Flows

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ExMuST – Project Outline

- Comprehensive experimental benchmark database for unsteady multi-stage turbomachinery flows
- Industry representative multi-stage axial compressor
- Two different complimentary experimental facilities
  - Unobstructed PIV measurements in a Refractive-Index-Matched facility at METU-AEPL
    - Instantaneous, phase-averaged and average-passage velocity fields, turbulent and deterministic stress distributions within the entire machine
  - Complimentary tests in air at a scaled multi-stage compressor model using the R4 facility at the von Karman Institute for Fluid Dynamics Turbomachinery and Propulsion Department
    - Steady state performance characterization
    - Unsteady flow field total pressure, flow angle, static pressure and flow unsteady Mach number.

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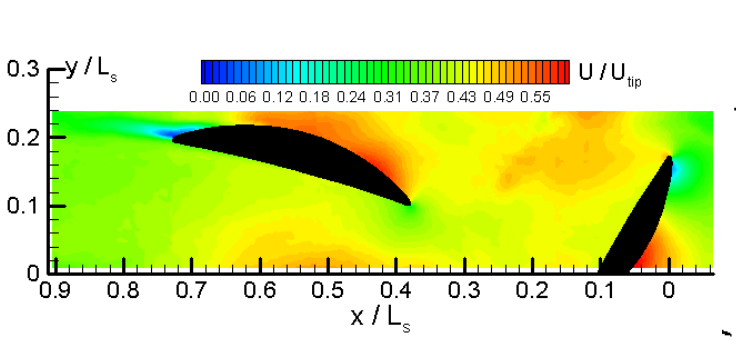

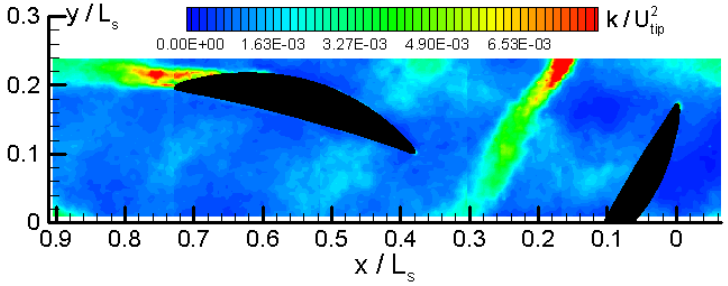

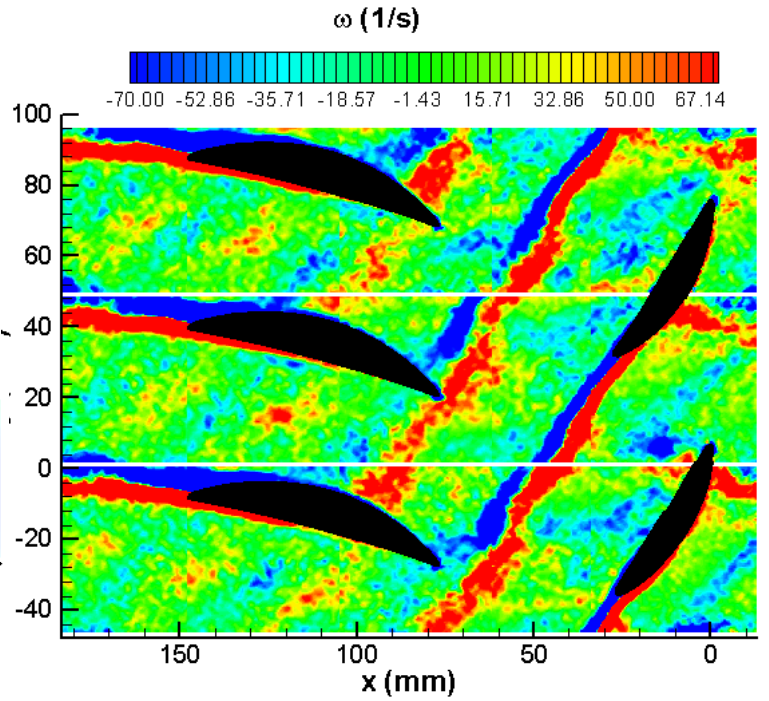

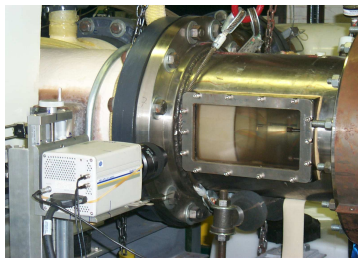

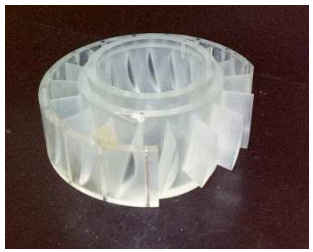

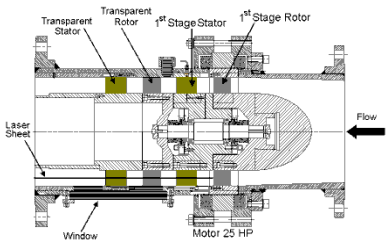

Unobstructed PIV data in an entire stage obtained using Refractive Index Matched PIV

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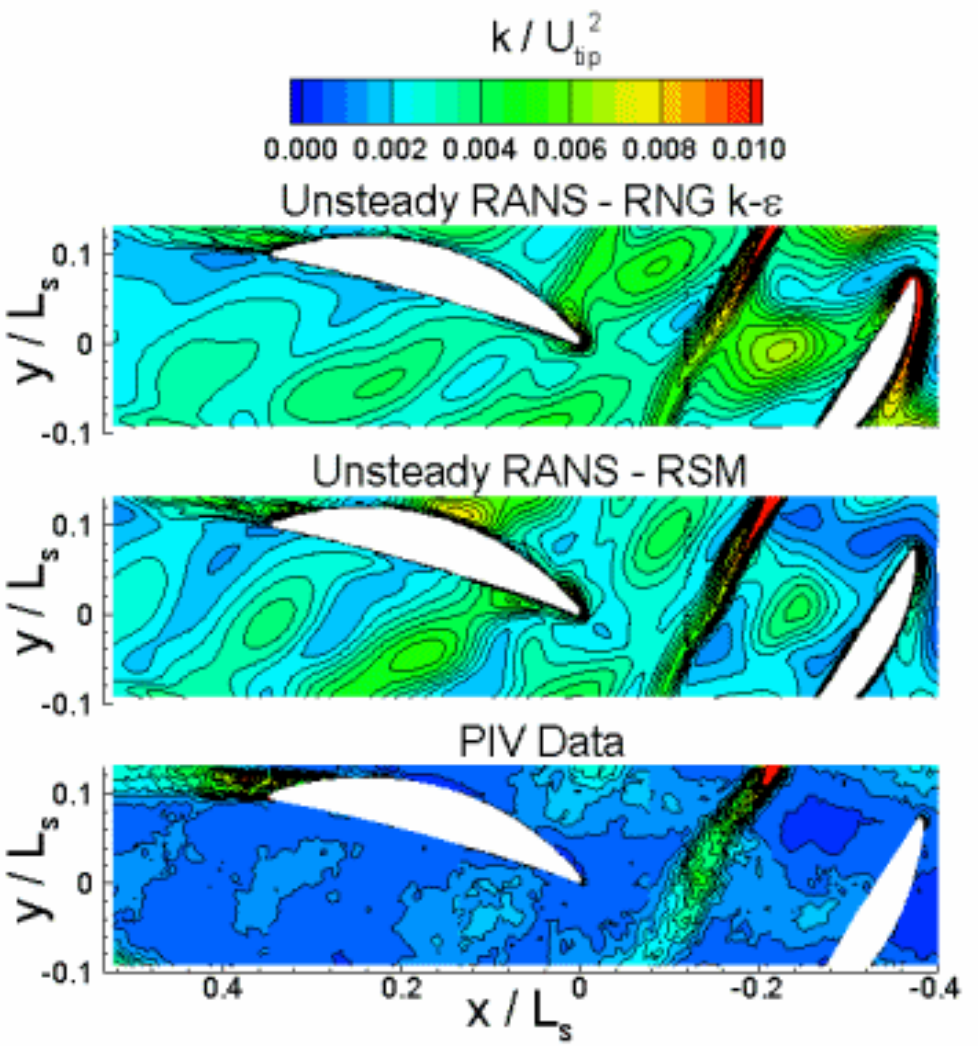


PIV vs. CFD

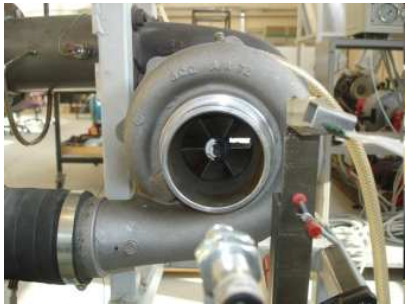
Potential Partners

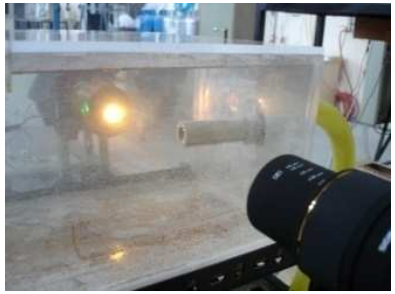
- ❑ METU-AEPL (Turkey)
- ❑ VKI (Belgium)
- ❑ NUMECA (Belgium)
- ❑ Tusas Engine Industries (TEI, Turkey)
- ❑ PARS Makina (Turkey)
- ❑ Other Industry Partners
- ❑ Other University Partners
- ❑ Other Research Centers as Partners

METU -VKI

Middle East Technical University
METU

AEPL
AEROSPACE ENGINEERING
PROPULSION LABORATORY





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An International Center for Advanced Training in Research through Research

Turbomachinery and Propulsion Department