

**13th International Symposium
on Unsteady Aerodynamics,
Aeroacoustics and Aeroelasticity
of Turbomachines 2012**

(ISUAAAT 13)

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Invited Papers

- I-1 **Chuichi Arakawa** Recent development and challenges of wind turbine CFD
- I-2 **Janusz Piechna** Compact wave energy conversion systems in turbomachinery
- I-3 **Chunill Hah** Development and application of Large Eddy Simulation for the control of unsteady flows in turbomachinery
- I-4 **Ivor Day** Stall and Surge: The Past and the Future
- [I-5](#) **Mehdi Vahdati** THE MECHANISM OF AEROELASTIC INSTABILITY IN TRANSONIC FANS
- I-6 **Li He** Concurrent blade design optimization for both aerothermal and aeromechanic performance
- [I-7](#) **Tony Arts** Research at VKI on heat transfer and aerodynamics in internal cooling channels, both fixed and in rotation
- [I-8](#) **Ethirajan Rathakrishnan** Corrugated Limiting Tab for Jet Mixing
- I-9 **Damian Vogt** Current Research on Turbomachinery Flutter within the EU Collaborative Research Project "FUTURE"

Keynote Paper

- K **Hafiz Atassi** History of the International Symposia on Unsteady Aerodynamics, Aeroacoustics, and Aeroelasticity in Turbomachines

Day 1

Session 1 Wind turbines, Wave energy

- [S1-1](#) **Koji Okamoto** (JP9) PORT CONDITION EFFECTS ON WAVE ROTOR INTERNAL FLOW DYNAMICS
- [S1-2](#) **Manabu Takao** (JP8) PERFORMANCE ESTIMATION OF A TWIN UNIDIRECTIONAL IMPULSE TURBINE FOR WAVE ENERGY CONVERSION

Session 2 Flutter, Forced response, Non-synchronous vibration

- [S2-1](#) **Stephen Clark** (US1) THE IDENTIFICATION OF FLUID MODES USING PROPER ORTHOGONAL DECOMPOSITION FOR NON-SYNCHRONOUS VIBRATION IN TURBOMACHINERY
- [S2-2](#) **Caetano Peng** (UK7) Studies of Non-Synchronous Vibration and Effects of Vane Stagger Variation LEO on Rotor Forced Response of an Axial Compressor
- [S2-3](#) **Mizuho Aotsuka** (JP18) NUMERICAL ANALYSIS OF FORCED RESPONSE OF HIGH PRESSURE COMPRESSOR CASCADE
- [S2-4](#) **Atsushi Tateishi** (JP19) MULTIMODE FLUTTER ANALYSIS BASED ON TIME-DOMAIN FLUID-SOLID INTERACTION SIMULATION AND SYSTEM IDENTIFICATION
- [S2-5](#) **Florian Fruth** (SW5) HARMONIC FORCE VARIATION DUE TO CHANGE IN BLADE COUNT RATIO -PHYSICAL INTERPRETATION
- [S2-6](#) **Hu Guotun** (CN4) AN IMMERSED BOUNDARY METHOD FOR SIMULATING AN OSCILLATING AIRFOIL

Session 3 CFD, Aeroelastic modelling

- [S3-1](#) **Julien Marty** (FR2/FR3) HIGH FIDELITY PREDICTION OF SEPARATION-INDUCED TRANSITION ON HIGH-LIFT LOW-PRESSURE TURBINE -PART I : REYNOLDS AVERAGED NAVIER-STOKES VS. LARGE-EDDY SIMULATIONS, /-PART II : UNSTEADY FLOW AND SPECTRAL ANALYSIS
- [S3-2](#) **Antoine Placzek** (FR1) EFFICIENT COUPLING STRATEGIES FOR THE NUMERICAL PREDICTION OF THE AEROELASTIC DAMPING BASED ON NONLINEAR TIME-INTEGRATED FLOW SIMULATIONS

Session 4 Rotor/stator interaction, Multi stage flows

- [S4-1](#) **Victor Saren** (RU1) ROTOR-STATOR INTERACTION IN AXIAL TURBOMACHINES
- [S4-2](#) **Romuald Rzadkowski** (PL1/PL2) UNSTEADY FORCES ACTING ON ROTOR BLADES IN SEVEN AND HALF STAGE / DIRECT INTEGRATION METHOD IN AEROELASTIC ANALYSIS OF ROTOR BLADE OF FIRST STAGE COMPRESSOR
- [S4-3](#) **Ryszard Szczepanik** (PL3) AEROELASTIC BEHAVIOUR OF ROTOR BLADES OF A FIRST STAGE COMPRESSOR IN CASE OF FOREIGN OBJECT IN ENGINE INLET
- [S4-4](#) **Felix Holzinger** (DE3) COMMISSIONING OF THE FUTURE COMPRESSOR
- [S4-5](#) **Martin Lange** (DE4) TIP AND HUB CLEARANCE VORTEX DEVELOPMENT DUE TO ROTOR-STATOR INTERACTIONS IN AXIAL COMPRESSORS
- [S4-6](#) **Artyom Romanov** (UK9) EXACT LINEARIZATION OF ONE-DIMENSIONAL TURBOMACHINERY PERFORMANCE MODEL
- [S4-7](#) **Mai Yamagami** (JP5) UNSTEADY EFFECTS ON SPANWISE MIXING PHENOMENA IN A MULTISTAGE AXIAL FLOW COMPRESSOR
- [S4-8](#) **Masaya Suzuki** (JP22) NUMERICAL INVESTIGATION ON PARTICLE MOTION IN ROTOR-STATOR INTERACTION FIELD OF AXIAL COMPRESSOR

Day 2

Session 5 Flow instability, Control, Casing treatment

- S5-1 Nobuyuki Yamaguchi** (JP2) A STUDY ON THE STAGNATION-STALL BOUNDARIES BASED ON ANALYTICALLY-EVALUATED SURGE CONDITIONS IN AXIAL FLOW COMPRESSORS
- S5-2 Nur Uddin** (NO1) A COMPRESSOR SURGE CONTROL SYSTEM: COMBINATION ACTIVE SURGE CONTROL AND SURGE AVOIDANCE
- S5-3 Koichi Yonezawa** (JP16) NUMERICAL INVESTIGATION OF STALL SUPPRESSION OF AN AXIAL FLOW FAN WITH AN AIR-SEPARATOR
- S5-4 Takahiro Nishioka** (JP13) MODAL-TYPE STALL INCEPTION IN AN AXIAL FLOW FAN
- S5-5 J. Anton Streit** (DE1) Trading Excessive Stall Margin for Efficiency: An Alternative Approach to Axial-Slot Casing Treatments for Transonic Compressors
- S5-6 Dakun Sun** (CN7) EFFECT OF ADVANCED CASING TREATMENT ON THE SUPPRESSION OF PRECURSOR OF ROTATING STALL IN TRANSONIC COMPRESSORS
- S5-7 Virginie Anne Chenaux** (CH1) Aeroelasticity at reversed flow conditions - experimental investigations of an oscillating annular compressor cascade

Session 6 Transonic compressor flows

- S6-1 Sebastian Leichtfuss** (DE7) AERODYNAMIC AND AEROELASTIC INVESTIGATION OF A TRANSONIC COMPRESSOR RIG
- S6-2 Simon Martin** (FR7) A NUMERICAL STUDY OF MECHANISMS FOR TRANSONIC STALL FLUTTER
- S6-3 Junichi Kazawa** (JP17) NUMERICAL INVESTIGATIONS OF ROTOR BLADE FLUTTER CHARACTERISTICS IN JAXA'S FAN TEST RIG
- S6-4 Clas Andersson** (SW1) AEROELASTIC INSTABILITY OF A TRANSONIC COMPRESSOR NEAR STALL
- S6-5 Jan Ostlund** (SW3) DESIGN AND PRE-TEST ANALYSES OF THE TRANSONIC FLUTTER RESEARCH COMPRESSOR FOR FUTURE

Session 7 Radial flow turbomachinery

- S7-1 Rudolf Izmaylov** (RU2/RU3) UNSTEADY FLOW IN CENTRIFUGAL COMPRESSOR NUMERICAL MODELLING AND EXPERIMENTAL INVESTIGATION / SMALL WIND TURBINE AERODYNAMICS: OLD WINE IN NEW BOTTLE
- S7-2 Zhongguo Sun** (CN5) EXPERIMENTAL STUDY ON THE EFFECT OF ROTOR/STATOR INTERACTION WITH DIFFERENT NUMBER OF STATOR BLADES
- S7-3 Yoshinobu Tsujimoto** (JP14) Effects of Acoustic Resonance on Phase Resonance in a Centrifugal Fan
- S7-4 Wataru Sato** (JP20) A STUDY ON UNSTEADY AERODYNAMIC EXCITATION FORCES ON RADIAL TURBINE BLADE DUE TO ROTOR-STATOR INTERACTION
- S7-5 Isao Tomita** (JP23) UNSTEADY STALL PHENOMENA IN CENTRIFUGAL COMPRESSOR FOR TURBOCHARGER

Day 3**Session 8 Turbine unsteady flows**

- S8-1 Bidur Khanal** (UK6) COMPUTATIONAL INVESTIGATIONS ON THE UNSTEADY AEROTHERMAL BEHAVIOUR OF AN HP TURBINE STAGE
- S8-2 Roque Corral Garcia** (ES2) PHYSICS OF VIBRATING LOW-PRESSURE TURBINE AIRFOILS
- S8-3 Ken-ichi Funazaki** (JP1) Studies on Two-Dimensional Contouring of High-Lift Turbine Airfoil Suction Surface as Separation-Control Device: Effects of Reynolds number and Flow Disturbances
- S8-4 Richard Sandberg** (UK1) ASSESSING THE SENSITIVITY OF TURBINE CASCADE FLOW TO INFLOW DISTURBANCES USING DIRECT NUMERICAL SIMULATION
- S8-5 Nenad Glodic** (SW2) INFLUENCE OF TIP CLEARANCE MODELLING IN PREDICTIONS OF AEROELASTIC RESPONSE IN AN OSCILLATING LPT CASCADE

Session 9 Turbine flutter, Blade row interaction

- S9-1 Sina Stapelfeldt** (UK3) A METHOD FOR MODELLING FLOW PAST NON-AXISYMMETRIC CONFIGURATIONS ON REDUCED PASSAGE COUNTS
- S9-2 Derek Micallef** (DE6) THREE-DIMENSIONAL VISCOUS FLUTTER ANALYSIS IN A TURBINE CASCADE UNDER SUPERSONIC FLOW CONDITIONS
- S9-3 Andrew Wheeler** (UK2) DIRECT NUMERICAL SIMULATIONS OF A TRANSONIC TURBINE TIP FLOW
- S9-4 Shuichi Ozaki** (JP7) EXPERIMENTAL AND NUMERICAL INVESTIGATIONS OF THE INFLUENCES OF AXIAL GAP BETWEEN BLADE ROWS ON PRESSURE FLUCTUATION
- S9-5 Mohammad Rahmati** (UK4) MULTI-ROW INTERFERENCE EFFECTS ON BLADE AEROMECHANICS IN COMPRESSOR AND TURBINE STAGES

Session 10 Steam turbine flows, Rocket turbine

- S10-1 Paul Petrie-Repar** (AU1) ESTABLISHMENT OF A STEAM TURBINE FLUTTER TEST CASE
- S10-2 Tomomi Nakajima** (JP3) PREDICTION OF THE UNSTEADY FORCE FOR TURBINE BUCKETS (THE EFFECTS OF BUCKET TURNING ANGLE AND THE THICKNESS OF NOZZLE TRAILING EDGE)
- S10-3 Tadashi Tanuma** (JP10) NUMERICAL INVESTIGATIONS OF UNSTEADY AERODYNAMIC FORCES ON THE LAST STAGE ROTATING BLADES IN A LARGE-SCALE STEAM TURBINE
- S10-4 Luying Zhang** (UK5) ANALYSIS OF ROTATING AERODYNAMIC INSTABILITY AND ITS AEROELASTIC COUPLING IN STEAM TURBINE LAST STAGE
- S10-5 Tobias Kalkkuhl** (DE8) UNSTEADY FLOW DUE TO PARTIAL ADMISSION IN A STEAM TURBINE CONTROL STAGE
- S10-6 Yuki Tokuyama** (JP6) Unsteady Flow Field and Structural Response Response in a Turbine Stage of a Rocket Engine

Day 4**Session 11 Jet noise, Airfoil acoustics**

- S11-1** **Arun Kumar Perumal** (IN1) Truncated Triangular Tabs for Supersonic Jet Control
- S11-2** **Shantanu Srivastava** (IN2) Limiting Tab for Square Jet Control
- S11-3** **Yuanyuan Gu** (CN1) A BOUNDARY INTEGRAL EQUATION TO PREDICT THE AERODYNAMIC NOISE SCATTERED BY IMPEDANCE BOUNDARY
- S11-4** **Zhang Qunlin** (CN2) AEROACOUSTIC MULTI-FREQUENCY INTEGRAL COMPUTATION ACCELERATED BY RETRACTED SERIES EXPANSION METHOD
- S11-5** **Tsutomu Oishi** (JP12) EXPERIMENTAL AND COMPUTATIONAL STUDY ON JET NOISE REDUCTION DEVICES SUCH AS NOTCHED, CHEVRON AND MICROJETS

Session 12 Turbo noise, Acoustic control

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- S12-3** **Shinya Kusuda** (JP11) FAN TONE NOISE DUE TO INTERACTION OF ROTOR BLADES WITH THE POTENTIAL DISTURBANCE OF A PYLON
- S12-4** **Michael Bartelt** (DE9) DESIGN METHODOLOGY AND EXPERIMENTAL VALIDATION OF AN AEROACOUSTIC TEST RIG FOR TURBOMACHINERY APPLICATIONS
- S12-5** **Xiwen Dai** (CN8) NONLINEAR ACOUSTIC PROPERTIES OF A HELMHOLTZ RESONATOR WITH GRAZING FLOW
- S12-6** **Yutaro Suzuki** (JP21) EXPERIMENTS ON ADAPTIVE ANTI-NOISE CONTROL FOR FAN NOISES

Session 13 Blade Vibration, BLISK, Mistuning, Friction

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- S13-2** **David Rockel** (DE5) NEW POSSIBILITIES OF BLADE MISTUNING BY THE USE OF ADDITIVE MANUFACTURING TECHNOLOGIES
- S13-3** **Majid Mesbah** (BE1) INVESTIGATION OF COMPRESSOR BLADE VIBRATIONS DUE TO SUBHARMONIC AERODYNAMIC EXCITATIONS
- S13-4** **Florent Payer** (FR4) U-RANS CALCULATION OF AERODYNAMIC DAMPING AND EXCITATION FOR FORCED RESPONSE PREDICTION
- S13-5** **Carlos Martel** (ES1) ASYMPTOTIC DESCRIPTION OF FLUTTER AMPLITUDE SATURATION BY NONLINEAR FRICTION FORCES
- S13-6** **Tomokazu Miyakozawa** (UK8) Pre-Laboratory-Rig Test Friction Damping Simulations of Stators and Rotors of an Axial Compressor
- S13-7** **Markus May** (DE10) MODEL UPDATING FOR THE AEROELASTIC ROM OF A MODERN BLISK