Scope

The AFCC 2021 aims at continuing the very successful series of conferences on Active Flow Control (AFC) in the years 2006 and 2010, followed by Active Flow and Combustion Control (AFCC) in 2014 and 2018.
By assembling experts in all areas of active flow and combustion control, the latest achievements in these fields are presented. Special focus lies on closed-loop control applied on new machine concepts.
Topics are dealing with combustion concepts like pulsed detonation and other forms of constant volume combustion as well as unsteady aerodynamics including unsteady cooling concepts. Methodologies are comprising experimental and numerical methods as well as model reduction techniques.

Venue

The conference will take place as a virtual event.

International Program Committee

F.S. Alvi	FAMU-FSU, USA
M. Bellenoue	ENSMA, France
E. Gutmark	University of Cincinnati, USA
M. Hinze	Universität Hamburg, Germany
R. King	TU Berlin, Germany
J. Moeck	TU Berlin, Germany
B.R. Noack	LIMSI-CNRS, France
D. Peitsch	TU Berlin, Germany
R. Radespiel	TU Braunschweig, Germany
J. Sesterhenn	Universität Bayreuth, Germany
D. Williams	IIT Illinois, USA

Registration

For online registration please visit
https://www.registrierung-online.info/tubs/form/afcc2021.html

The online conference is free of charge.

Registered participants will get access to
- single track online session
- final papers
- pre-recorded paper presentations

Organizing Committee

M. Eck	TU Berlin, Germany
R. King	TU Berlin, Germany
V. Mehrmann	TU Berlin, Germany
C.O. Paschereit	TU Berlin, Germany
D. Peitsch	TU Berlin, Germany

Chairman

D. Peitsch	TU Berlin, Germany

Conference
Virtual Event

AFCC 2021

Active Flow & Combustion Control

September 28 - 29, 2021
Berlin, Germany

Organized by the
Collaborative Research Center 1029,
Berlin

Sponsored by DFG

DFG Deutsche Forschungsgemeinschaft
German Research Foundation

Technische Universität Berlin

Freie Universität Berlin

SFB 1029

Agenda

Tuesday, 28th September 2021

10:00-10:30 *Welcome and introduction to SFB 1029*
D. Peitsch, TU Berlin

CVC and Ignition Control

10:30-10:45 *Pressure Gain and Specific Impulse Measurements in a Constant-Volume Combustor Coupled to an Exhaust Plenum*
Boust, Bellenoue, Michalski; CNRS - ISAE-ENSMA

10:45-11:00 *Control of auto-ignitive wave propagation modes from hot spots by mixture tailoring in shockless explosion combustion*
Zander, Vinkeloe, Djordjevic; TU Berlin

11:00-11:15 *Autoignition Modes in a Shockless Explosion Combustion*
Yücel, Habicht, Bohon, Paschereit; TU Berlin

11:15-11:30 *Fuel-rich natural gas conversion in HCCI engines with ozone and dimethyl ether as ignition promoters: a kinetic and exergetic analysis*
Freund, Horn, Atakan; University of Duisburg-Essen

--- coffee break, breakout-rooms, 15 min ---

Combustor-Turbine-Integration: Pressure Fluctuations and Turbulence

11:45-12:00 *Computational simulation of an exhaust plenum charged by a multi-tube pulsed detonation combustor*
Nadolski, Haghdoost, Oberleithner, Klein; TU Berlin, FU Berlin

12:00-12:15 *Pressure Fluctuations in an Annular Plenum Downstream of a Multi-tube Pulse Detonation Combustor*
Habicht, Yücel, Bohon, Haghdoost, Oberleithner, Paschereit; TU Berlin

12:15-12:30 *Reduction of Pressure Fluctuations in an Annular Pulsed Detonation Combustor Mockup by Iterative Learning Control Using Eigenvector-Based Binary Solution Sets and Iterative Model Identification*
Topalovic, Arnold, King; TU Berlin

12:30-12:45 *Roughness Induced Secondary Motions – From Turbulent Channel to Unsteady Combustion Chamber Flows*
Frohnapfel; Karlsuhe Institute of Technology

--- lunch break, 90 min ---

Combustior-Turbine-Integration: Cooling and Unsteady Performance

14:15-14:30 *Dynamic Forced Impingement Cooling: Latest Experimental Results Regarding Variations in Flow Guidance and Pulse Parameters*
Haucke, Berthold, Meyners; TU Berlin

14:30-14:45 *Time-resolved analysis of Film Cooling Effects under Pulsating Inflow Conditions*
Heinrich, Herbig, Peitsch; TU Berlin

14:45-15:00 *Aero-Thermal Characterization of Accelerating and Diffusing Passages Downstream of Rotating Detonation Combustors*
Braun, Paniagua, Ferguson; Purdue University

15:00-15:15 *Visualization and Operational Characterization of the Rotating Detonation Combustor*
Gutmark; University of Cincinnati

--- coffee break, breakout-rooms, 15 min ---

Numerical Methods

15:30-15:45 *Linear forcing of compressible isotropic turbulence in rectangular domains with adapted grids*
Sroka, Reiss; TU Berlin

15:45-16:00 *Decomposition of flow data via gradient-based transport optimization*
Black, Schulze, Unger; TU Berlin

16:00-16:15 *Towards Data-Driven Model Reduction of the Navier-Stokes Equations using the Loewner Framework*
Diaz, Heinkenschloss; Rice University

--- breakout-rooms, open end ---

Wednesday, 29th September 2021

Active Combustion Control

10:00-10:15 *Optimization based multiscale control of HCCI engines - is data driven control the key to handle complexity*
Andert, RWTH Aachen University

10:15:10:30 *Influence of low temperature reaction kinetics of hydrocarbon fuels on control schemes for HCCI engines*
Kasper, University of Duisburg-Essen

10:30-10:45 *Enhancement of blowout limits in lifted swirled flames in methane-air combustor by the use of sinusoidally driven plasma discharges*
de Giorgi, Bonuso, Mehdi, Shamma, Harth, Zarzalis, Trimis; University of Salento, Karlsuhe Institute of Technology

--- coffee break, breakout-rooms, 15 min ---

AFC and Performance of Turbomachinery

11:00-11:15 *The effect of periodic disturbance patterns on the efficiency of active flow control in a linear stator casade*
Neuhäuser, King; TU Berlin

11:15-11:30 *DBD Plasma Actuation on the Blades of Axial-Flow Turbomachinery*
Greenblatt, Pfeffermann, Keisar; Israel Institute of Technology

11:30-11:45 *Numerical Analysis of Unsteady Compressor Performance under Boundary Conditions caused by Pulsed Detonation Combustion*
Neumann, Rähse, Stathopoulos, Peitsch; TU Berlin

11:45-12:00 *High-Fidelity Simulations of Unsteady Combustor/ Turbine Interaction at a 3-Stage Axial Turbine using Realistic Synthetic Inlet Conditions*
Lo Presti, Post, di Mare; Ruhr-Universität Bochum

12:00-12:15 *Efficiency Increase and Start-Up Strategy of an Axial Turbine Stage Under Periodic Inflow Conditions Using Extremum Seeking Control*
Topalovic, King, Herbig, Heinrich, Peitsch; TU Berlin

--- lunch break, 90 min ---

AFC Methods

13:45-14:00 *Experimental Investigations of Active Flow Control using a Piezo Adaptive Blade in a Compressor Cascade under Periodic Boundary Conditions with high Strouhal-Number*
Werder, Kletschke, Liebich; TU Berlin

14:00-14:15 *A Comparison of Optimal, Binary Closed-loop Active Flow Control Applied to an Annular Compressor Stator Cascade with Periodic Disturbances*
Fietzke, Mihalyovics, King, Peitsch; TU Berlin

14:15-14:30 *Numerical methodologies for magnetohydrodynamic flow control for hypersonic vehicles*
Muir, Michael, Nikiforakis; University of Cambridge

14:30-14:45 *A novel water jet concept for gust load alleviation*
Bauknecht, Bongen; TU Braunschweig

14:45-15:00 *An Experimental Approach to Optimal Placement of Active Flow Control Actuators Using a Genetic Algorithm*
Zigunov, Alvi; Florida State University

15:00-15:15 *Closing of conference*
Peitsch, King; TU Berlin

--- breakout-rooms, open end ---

Contact

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