

2021 AIAA Scitech (Virtual)
January 11 - January 15, 2021

Summary of PGC Program Sessions
(Updated to December 23, 2020)

Few general notes:

- All sessions are 75 minutes long
- Each session includes 5 presentations, 15 minutes long each
- Each presentation is pre-recorded, with a duration of about 10 minutes; the remaining time is allocate for Q&A

The following list summarizes the Pressure Gain Combustion sessions only, and it is provided as a guidance. Please verify what provided here against the final program published online: <https://www.aiaa.org/SciTech/program>

Additional information about the event and its format can be found here: <https://www.aiaa.org/SciTech/program/virtual-event-faqs>

Day 1 — Monday January 11, 2021

Session ID: PGC-05

Session title: Numerical Modeling and Analysis

Meeting time: 14:30 — 15:45 EST

Chairs: Daniel Paxson and Douglas Schwer

Title of paper	Name of presenter
Descending Modal Transition Study in a Rotating Detonation Rocket Engine	Batista, Armani
A Simple Model for Rotating Detonation Rocket Engine Sizing and Performance Estimates	Paxson, Daniel
Validation and Application of a Reduced-Order Rotating Detonation Engine Inlet and Fill Zone Model	Bedick, Clinton
Detonation geometric model (detgem) as a test bed for propagation dynamics in engineering geometries	Crane, Jackson
Computational Fluid Dynamics Combustion Modeling for Rotating Detonation Engines	Strakey, Peter

Day 2 — Tuesday January 12, 2021

Session ID: PGC-02/AMT-12

Session title: Diagnostics - Development and applications

Meeting time: 13:00 — 14:15 EST

Chairs: Andrew Sisler and Joshua Gray

Title of paper	Name of presenter
Flow Visualization inside a Rotating Detonation Engine near Injection Nozzles Using Point-Diffraction Interferometry	Mizukaki, Toshiharu
High-Bandwidth Laser-Absorption Measurements of Temperature, Pressure, CO, and H ₂ O in the Annulus of a Rotating Detonation Rocket Engine	Matthews, Garrett
Mid-infrared Pulsed Upconversion Imaging in a Rotating Detonation Combustor	White, Logan
Rotating Detonations through Hydrogen-Air and Ethylene-Air Mixtures in Hollow and Flow-Through Combustors	Wiggins, Rachel
Two-Color OH PLIF thermometry in a detonation channel	Grib, Stephen

Session ID: PGC-03/AMT-14

Session title: Diagnostics - Applications to RDC

Meeting time: 14:30 — 15:45 EST

Chairs: Clinton Bedick and Mirko Gamba

Title of paper	Name of presenter
Application of 100 kHz Acetone-PLIF for the Investigation of Mixing Dynamics in a Self-Excited Linear Detonation Channel	Ayers, Zach
High-Speed Particle Image Velocimetry of a Natural Gas-Air Rotating Detonation Engine	Walters, Ian
Megahertz OH-PLIF Imaging in a Rotating Detonation Engine	Fugger, Christopher
Exit plume thermometry using kHz rate hybrid fs/ps N ₂ -RCARS in the exhaust of a H ₂ /air RDC	Athmanathan, Venkat
Sustainable Particles Seeding in Air-Breathing Rotating Detonation Engine	Burke, Robert

Day 3 — Wednesday January 13, 2021

Session ID: PGC-06

Session title: Pressure Gain Devices

Meeting time: 13:00 — 14:15 EST

Chairs: Frank Lu and Bayindir Saracoglu

Title of paper	Name of presenter
LES Study of Active Valve Resonant Pulse Combustor	Lisanti, Joel
Study of Oblique Shock Induced Reactions at Moderate Total Temperatures	Rosato, Daniel
Ignition Criteria for Oblique Detonation Waves in a Hydrogen-Air Premixed Freestream	Bachman, Christian
Effect of a Nozzled Exhaust Plenum Downstream of a Constant-Volume Combustion Chamber	Boust, Bastien
Determining the Pressure Pulse Severity of a Pressure Gain Combustion Device	Fernelius, Mark

Session ID: PGC-07/PC-17

Session title: Detonation Physics I

Meeting time: 14:30 — 15:45 EST

Chairs: Koichi Hayashi and Donald Ferguson

Title of paper	Name of presenter
Statistical Analysis of Hydrocarbon Detonation Wave Structure in a Narrow Channel	Frederick, Mark
Gaseous Detonations in Planar Curved Rectangular Channels with High Aspect Ratio	Hencel, Regan
Experimental Investigation of Detonations in a Premixed Detonation Tube	Knisely, Andrew
Reinitiation Mode Study of a Regular Planar Detonation	Vijayakumar, Nandakumar
Numerical study on early-times laser controlled detonative propulsion	Sato, Tomoyuki

Day 4 — Thursday January 14, 2021

Session ID: PGC-09

Session title: Fuels and Diluents I

Meeting time: 10:00 — 11:15 EST

Chairs: Antony Dean and Venkat Tangirala

Title of paper	Name of presenter
The Ideal Air-Breathing Rotating Detonation Engine Modeling and Conceptual Application to Aircraft	JuHoe, Kim
Experimental and Numerical Study on Disc-RDE: Flow Structure and its Performances	Hayashi, A. Koichi
Closed Loop Integration of a Rotating Detonation Combustor in a T63 Gas Turbine Engine	Fievisohn, Robert
Effects of CO ₂ Diluent on Rotating Detonation Combustor Operation	Feleo, Alexander
RDE Diluent Mixing & Shock Negation	Nordeen, Craig

Session ID: PC-18/PGC-08/GTE-10

Session title: Model Validation for Propulsion: Rotating Detonation Flows

Meeting time: 10:00 — 11:15 EST

Chairs: Venke Sankaran and Chiping Li

Title of paper	Name of presenter
Numerical Methods for the LES of Rotating Detonation Rocket Engines	Candler, Graham
Progress Toward Advanced Modeling and Simulation of the AFRL Oxygen-Methane Rotating Detonation Rocket Engine	Schau, Kyle
Model Validation in High-Fidelity Simulations of a Rotating Detonation Rocket Engine	Lietz, Christopher
An Analysis of Mixing and Detonation Structure in a Rotating Detonation Rocket Engine	Prakash, Supraj

Session ID: PGC-10

Session title: Fuels and Diluents II

Meeting time: 13:00 – 14:15 EST

Chairs: Jiro Kasahara and Joshua Codoni

Title of paper	Name of presenter
Evidence of Carbon Driven Detonation Waves within a Rotating Detonation Engine	Dunn, Ian
Heterogeneous Detonation Physics as Applied to High Pressure Rotating Detonation Engines	Humble, Jenna
Development of Condensed Phase Detonation Performance Models for Rotating Detonation Rocket Engines	Harroun, Alexis
Propulsive Performance of Cylindrical Rotating Detonation Engine with Propellant Injection Cooling	Goto, Keisuke
Improving the Stability and Operating Envelope for a Small Scale, High Frequency Rotating Detonation Engine (RDE)	Florino, Nathan

Session ID: PGC-11/PC-22

Session title: Detonation Physics II

Meeting time: 14:30 – 15:45 EST

Chairs: Kareem Ahmed and William Hargus

Title of paper	Name of presenter
Investigation of Controlled Deflagration-to-Detonation Transition of Hydrocarbon Fuels	Hytovick, Rachel
Deflagration-to-detonation transition inside reactant-product mixing layers	Shi, Xian
Wedge-Induced Oblique Detonations with Small Heat Release	Antonio L Sanchez
NO effects on detonation formation in n-pentane/air mixtures with temperature gradients	Tianhan Zhang
The Effect of Ignition Pressure Pulse on Light-Off in an RDE	Christopher Stevens

Day 5 — Friday January 15, 2021

Session ID: PGC-13

Session title: RDC Dynamics

Meeting time: 14:30 — 15:45 EST

Chairs: Myles Bohon and Carson Slabaugh

Title of paper	Name of presenter
Transient Injector Response to Various Wave Interactions in Unwrapped RDE Combustor	Chang, Minwook
Analysis of Single Wave Behavior in a Linear Detonation Channel Using Injector Plane Oriented Direct Imaging	Rathsack, Tylor
Observations of DC Shift and Chugging in a Pressurized Rotating Detonation Combustor	Anand, Vijay
Individual Wave Detection and Tracking within a Rotating Detonation Engine through Computer Vision Object Detection applied to High-Speed Images	Johnson, Kristyn
Effect of Cross-Sectional Area Profiling on the Performance of Disk Rotating Detonation Combustor	Agrawal, Ajay

Session ID: PDL-03/AMT-30/PGC-14

Session title: Diagnostics III

Meeting time: 14:30 — 15:45 EST

Chairs: Christopher Limbach

Title of paper	Name of presenter
Spatio-Temporal Studies on Laser Induced Plasma Interactions with Micro-Particles using Stereo-Imaging	Kumar, Atulya
Spatially and Temporally Resolved Electron Temperature and Number Density Measurements in 100-kHz Nanosecond Pulse Burst Discharge	Wu, Yue
A.C. Plasma Anemometer Measurements in Supersonic Hydrogen Jet	Matlis, Eric
Uncertainty Quantification in Kiel Probes for RDC Applications	Bach, Eric
Experimental Measurements of Torque and Force on a Rotating Detonation Engine with Six-Axis Force Sensor	Sawada, Satoru