ONLINE SHORT COURSE

FUNDAMENTAL AND APPLICATIONS OF PRESSURE GAIN COMBUSTION

Instructed by experts from the AIAA Pressure Gain Combustion Technical Committee

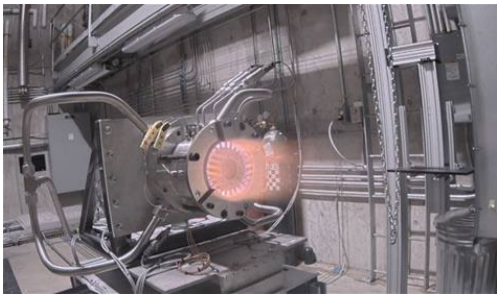
OVERVIEW

Unlike conventional isobaric combustion, pressure gain combustion (PGC) is focused on technologies that are able to increase the pressure of the working fluid through the combustion process without the need for additional mechanical compression. PGC can be achieved with either deflagration or detonation although the mechanism for pressure gain would be different depending on the method of combustion. Regardless of the approach, PGC offers greater work availability compared to isobaric combustion, but it has unique challenges. As a result of the potential improvement in cycle efficiency, as well as advances in computational and experimental methods, there has been a growing interest in PGC for applications in aerospace propulsion and power generation.

This course provides an overview of the unique aspects of PGC. The course introduction will begin with a historic perspective of PGC and include thermodynamic theory comparing PGC to other relevant power cycles. This is followed by an overview of several major classes of PGC such as Pulse Combustion, Wave Rotor Combustion Engines (WRCE), Pulse Detonation Engine (PDE) and Rotating Detonation Engines (RDE). As PGC research has its own unique challenges, the course offers a review of relevant and state-of-the-art computational and experiments methods that are utilized in both fundamental and more applied studies. The course will include a discussion of systems integration along with lessons learned from some demonstrated applications. Government funded programs have been critical and the course will include an overview of the various programs and potential roadmaps for helping to advance the technology forward. Instructors from this course come from various reaches of technology development including fundamental research, program direction and industry.

LEARNING OBJECTIVES

- A historical context in the development of PGC systems
- Qualitative background of the fundamental physics pertinent to PGC, including low-order physical and thermodynamic modeling, highlighting the difference from the Brayton cycle.
- An understanding of different PGC systems and their pros and cons
- An understanding of the integration of PGC systems to other components for aerospace propulsion and for power production
- An awareness of the challenges involved in developing PGC technologies



DETAILS

DATES: 28 September – 21 October 2022 (4 weeks, 8 Classes, 16 Hours Total)

TIME: Every Wednesday and Thursday at 1300-1500 Eastern Time (1000-1200 Pacific Time)

COST: Non-Member Price: $1,095 / AIAA Member Price: $895 / AIAA Student Member Price: $495

All sessions will be recorded and available for on-demand replay; course notes will be available for download.

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