



2015 Year in Review

Dear Colleagues and Friends,

This is the first annual newsletter summarizing the state of the Combustion, Ignition, Radiation, and Energy Laboratory. It is an opportunity to remain connected, provide personal insights, and to share successes and the status of the research group. I hope that you will find it enjoyable and informative.

Overview

I am genuinely thrilled at the progress made by the research group during 2015 and the development and accomplishments of many individuals. This was the year that the laboratory transitioned from being a small group funded by my start-up funds to a fully funded vibrant research program. We continue to gain respect within the school (e.g., received endowed faculty position) and nationally. The group consists of seven graduate students, a co-advised graduate student, and five undergraduate students. We are grateful for collaborations with AFRL, Virginia Tech, and Georgia Tech. performing research, and collaborators on proposals (4 different institutions). We are fortunate to have funding secured from FAA, AFRL, Joint Fire Science Program, NETL, American Chemical Society, and Strategic Environmental and Development Program.



Research group in fall of 2015.

Over the past year we actively conducted or started research projects related to each of our competencies: combustion, ignition, radiation, and energy. More details can be found at the group website: <http://research.engr.oregonstate.edu/blunckgroup/home>. Our focus thus far has primarily had aviation applications thus far. However, I made a conscious decision to extend our research portfolio into forest fire. The cross pollination from aviation research to forest fires is proving quite beneficial. The group will have three PhD students performing forest fire research by mid-2016.

On a personal note, I am thrilled about the culture of the research group and the professional development of the students. There is a vibrancy and spirit of cooperation among the students. They love to learn and to accomplish. Several have approached me about establishing collaborations with other institutions or collecting data for additional publications. I see the students being excited about learning new concepts, thinking critically, and learning to write technically. The personal development of students is the greatest product of the research group.

Establishment of Propulsion Laboratory

I am excited to announce that the CIRE group has set up a Propulsion Laboratory at Oregon State University in collaboration with the AIAA club. This laboratory has enabled tremendous opportunities for us to perform research which is not viable in the main campus. The laboratory has remote test capabilities, office space for students, a secure bunker, and space for multiple thrust stands. Research related to detonations, hybrid and solid rockets, and gas turbine combustors is being performed at the laboratory with additional research planned. To highlight interest in the laboratory, 16 students volunteered on a Saturday during the summer to gut the laboratory and clean the grounds.



(Top) Propulsion laboratory, (bottom) hybrid rocket testing.

Student Successes:

- Senior design teams built, evaluated, and demonstrated an afterburner for a JetCat. The project was considered the “highest performing among the 34 teams” funded by the program. A video of the afterburner can be seen at the group website.
- We had six student presentations over the past year including four students at the Western States Combustion Meeting in Provo, Utah in October. The presentations were related to the development of spark kernels, radiation emissions as jet-like fuels are burned, turbulent flame speed of jet fuels, and the effect of turbulence on radiation emissions.
- Sebastian Okhvat successfully defended this thesis entitled, “Temperature Evolution of Spark Kernels in Quiescent and Cross-flow Conditions.” He received some of the highest reviews from any committee I

have served on. He is now actively looking for work, preferably in the aviation community.

- Eric Zeuthen started working at National Energy and Technology Laboratory setting up a supersonic combustor. He should have the opportunity to continue working at NETL after graduation in spring of 2016.
- Aaron Fillo received a NSF Graduate Fellowship. This is one of the most prestigious awards that a graduate student can receive.
- Two of the graduate students had significant roles in the OSU rocket team, which placed 3rd at a national competition during the summer.

Other Accomplishments:

- I was named the 2015-2016 AIAA Young Engineer of the Year for the Pacific Northwest Section
- The group received a Welty Faculty Fellowship (endowed faculty position)
- I am helping to spearhead an effort to establish the Oregon FIRE (Fire, Innovation, Research, and Education) Center. This concept will be taken to dean level administrators early in 2016.

Concluding Remarks:

I am looking forward to 2016 for multiple reasons. The group will see the maturation of several projects and have resulting discoveries and publications. The capabilities of the Propulsion Laboratory will continue to be developed and enable more challenging (and arguably more interesting) research. Several students will graduate and transition to jobs. Needless to say, I look forward to the group continuing to benefit from the efforts from the last two and a half years.

I hope that each of you are doing well professionally and personally. Feel free to stop and visit the group when you are in the Pacific Northwest.

Best Wishes,

David