



Wednesday
September 20, 2017
3:30 pm
Room 1005 EECS

Prof. Martin Gundersen

University of Southern California

Nanosecond Pulsed Power-Generated Transient Plasma for Energy and Environmental Applications

The use of short (5-50 ns), high voltage unipolar pulses for plasma initiation in atmospheric and higher pressure environments will be reviewed for applications including ignition, combustion, and emissions remediation, and, if time allows, wine. These plasmas are transient – the plasma is generated in times short compared to the equilibration of the plasma electron energy distribution. Transient plasmas substantially reduce ignition delay under a variety of engine and fuel/air conditions, show promise for improving engine efficiency, and efficiently reduce emissions from various sources. Results for studies of plasma enhancement of internal combustion and pulse detonation engines will be reviewed. Emissions remediation (e.g., NO_x, SO_x, and particulate reduction) have been obtained with ns plasmas, and will also be reviewed. Transient plasmas for these applications typically require only small pulse energy (10 mJ to < 1 J) which significantly and beneficially affects energy efficiency. However, they require fast rising rates (\leq ns). The pulsed power technology used to generate these plasmas is therefore important and that technology will be reviewed.

About the Speaker: Martin Gundersen is the Lloyd F. Hunt Professor of Electrical Power Engineering at the University of Southern California (USC) with appointments in Electrical Engineering, Physics and Astronomy, and Chemical Engineering and Materials Science. He is Life Fellow of the IEEE, Fellow of the Optical Society of America, and recipient of the Schneider Award (IEEE Power Modulator and High Voltage Conference), the Germeshausen Award (IEEE Power Modulator Symposium) and several USC awards for research and service. He has chaired NATO Workshops and the Power Modulator Conference. He organized American Film Institute “Catalyst” Workshops for teaching aspects of the entertainment industry to scientists and engineers, and has been technical advisor for several Hollywood films. His spin-off companies include Pulse Biosciences and Transient Plasma Systems. His research interests include pulsed power science and engineering, medical, biomedical, and agricultural applications of pulsed power, and science education.