

# Seminar

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## Institute for Plasma Research

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**Title :** Investigations in to the Design of Power Supplies for Generation of Non-thermal and Thermal Plasma in Air

**Speaker :** Mr. Vishal Jain

Institute for Plasma Research, Gandhinagar

**Date :** 6th December 2017 (Wednesday)

**Time :** 03.30 PM

**Venue :** Seminar Hall, IPR

### **Abstract :**

Plasma is highly active state of matter that has potential to replace hazardous chemical processes in the industries. In non-thermal plasma categories, Uniform glow discharge air plasma can be generated using various high voltage power supplies topologies and Dielectric Barrier Discharge (DBD) technique particularly in atmospheric pressure plasma generation. However, these plasmas contain streamers due to atmospheric pressure. Low pressure plasmas are used by laboratories only and cannot be used for inline processes in industries. Several efforts have been made by researchers all over the world to design and develop power supply topologies for generation of streamer free DBD air plasma. However, using the conventional high voltage power supply topologies, almost all the research work describe the generation of streamers in atmospheric air plasma.

In thermal plasma category, a feedback control system is devised and simulated in MATLAB Simulink for generating plasma arc in current source mode. Plasma arc is very useful tool in generating high temperature by converting electrical energy into thermal energy in an efficient manner. This is based on fixed frequency duty cycle control with series resonant mode of operation. This series resonant mode provides higher gain at low load impedances. Further, a feedback control system was designed for generating a high voltage regulated output in voltage source mode that is based on parallel resonant converter. This parallel resonant converter provides a high gain for high impedance load and thus, provides protection on short circuiting load useful particularly in case of magnetron in microwave generation. A detailed study using MATLAB Simulink of this feedback design is presented.

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