

Development of Blumlein Pulse Forming Network Based Pulse Power Supply and optimization of pulsed plasma for Maximum Microwave Attenuation

Abstract

Dielectric Barrier Discharge (DBD) plasma is widely used in surface flow modification due to its nonthermal nature and ease of integration into aerodynamic systems. This study focuses on the design simulation, development and optimization of a variety of DBD plasma power supplies (High Voltage High

Frequency) to maximize its effectiveness in altering surface flow characteristics. Key electrical parameters, including voltage amplitude, frequency, pulse width, and waveform shape, are systematically investigated for their influence on plasma generation and aerodynamic performance. Experimental and simulation-based approaches are employed to evaluate plasma actuator behavior under varying power supply conditions. The results reveal that optimized pulsed or modulated power configurations significantly enhance the momentum transfer to the boundary layer, leading to improved

control of flow separation and drag reduction. This work contributes to the efficient design of plasma actuators for flow control applications in aerospace and automotive systems, offering insights into power supply tuning for enhanced surface interaction.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 1

2) Name of course with branch/discipline: M.E./M.Tech Electrical

3) Academic Project duration:

(a) Total academic project duration: 45 Weeks

(b) Student's presence at IPR for academic project work: 4 Full working Days per week

**Email to: rajan@ipr.res.in[Guide's e-mail address] and
project_ee@ipr.res.in [Academic Project Coordinator's e-mail address]**

Phone Number: 079 -09427304227 [Guide's phone number]