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Design and Fabrication of an Electrical Breakdown Facility

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ABSTRACT

Usage of traditional experimental instrumentation has not kept up with the rate of advancement in modern educational material. Teaching aids used in academia have to be updated to ensure effective understanding of content among the students. The use of outdated vacuum chambers as visual aids in plasma physics classrooms have proven to be ineffective for the students and teachers, due to limited viewing ports on the metallic walls of vacuum chamber for viewing the plasma discharge phenomenon. It is important to address this challenge, which invigorates the need for the use of a transparent vacuum chamber as a teaching aid. The design and fabrication of the electrical breakdown facility was a multiple phase project. Firstly, there were various viable solutions designed and analyzed. Secondly, parts were ordered and machined for the required design configuration. Finally, the design was assembled and experiments were conducted for testing and design evaluation. The new vacuum chamber is very efficient in displaying the plasma discharge phenomenon which will enhance the students' understanding of plasma physics in the classroom. Manufacturing the most effective design is an engineering challenge; of which iterations and analysis of the design throughout the process are an indispensable part, which is why there always a need for additional work in the field.

KEYWORDS

Electrical breakdown facility, vacuum chamber, plasma discharge, viewing ports on vacuum chamber.