

Technical Committee on Electrical Discharges, Plasma, and Pulsed Power Technologies

1. Objective

The Technical Committee on Electrical Discharges, Plasma, and Pulsed Power Technologies was established on January 1, 2019, through a merger between the Committee on Electrical Discharge Technology and the Technical Committee on Plasma Pulse Power Technology

The "discharge phenomenon" is a nonlinear phenomenon in which a current flows upon applying a strong electric field to a material. Depending on the generation environment (medium), electric field distribution, and power source configuration, the properties and nature of this phenomenon vary significantly. From an engineering perspective, it is important to maintain insulation without causing discharge and reliably to cut off discharge in various switching devices when delivering electricity. On the other hand, efficient generation of desired discharge is an important technical issue. The Committee on Electrical Discharge Technology has dealt with discharge phenomena in gases, vacuums, liquids, solids, and composites from their basics to applications.

On the other hand, "plasma phenomena," which the Technical Committee on Plasma Power Technology has been addressing, has long been known as a discharge phenomenon. Moreover, academic and technological developments have been pursued to understand phenomena associated with the composition of the universe, astronomical events, and the upper layer of the Earth. Subsequently, as the number of scholarships on understanding plasma phenomena and their basic physics has increased and technological applications thereof have rapidly developed, fluorescent lamps; plasma cutting and discharge switching; and film deposition, etching, and surface reforming in semiconductor manufacturing have been developed as technology and equipment that utilize plasma. In addition, increasing attention has been focused on the field of space owing to the introduction of ion engines and other thrust technology based on plasma. Furthermore, advancing research into controlled thermonuclear fusion energy is a major project in the plasma application field. In recent times, biological, medical, and agricultural technology based on plasma have gained attention. In addition, technologies for sterilization and disinfection, wound treatment, hemostasis, surgical treatment for cancers, cultivation for food promotion, and gene transfer have been developed. Moreover, the "pulse power technology" addressed by this technical committee has been developed using energy in a temporospatially compressed form to achieve exceptionally high energy density states, mainly through the development of basic technology for new energy and extreme physical property research, such as inertial fusion and shock waves, in Europe and the US. In Japan, there is an active globally pioneering civilian application study, in addition to the exploration of energy fields such as heavy ion beam inertial fusion research and research that aims at practical applications, e.g., environment/recycling, materials, electronics, bio/medical, agriculture, and food. In addition, power supply technology with regard to pulse power generation and control is in development as the action of pulse power mainly depends on the time history of power.

As a connection between these electrical discharges, plasma power and pulse power have long been sought; the aim is to merge these technical committees and systematically promote research activities

with regard to discharge, plasma, and pulse power fields in a robust manner, thereby enhancing fusion.

2. Fields of activity

The aim is to foster engineers capable of being world leaders and contribute to further development in this field by focusing on the importance and appeal of discharge, plasma, and pulse power technologies based on the following viewpoints:

1. Advanced scientific research and systematic investigation of science and engineering supporting discharge, plasma, and pulse power technologies
2. Exploration of new sciences in discharge, plasma, and pulse power technologies and development of newly applied technologies
3. Research and surveys in cooperation with other fields from a future-oriented and international perspective.

3. Activity content

Technical Meetings are held about five times a year. Joint meetings are held with the Technical Committee on Dielectrics and Electrical Insulation, Technical Committee on High Voltage Technology, Technical Committee on Switching Protection and Technical Committee on Stationary Equipment. Several cooperative activities with the IEEDJ, IEEE Nuclear Plasma Science Society, IEEE Dielectrics and Electrical Insulation Society, IEEE Power and Energy Society are conducted. Moreover, investigation committees on electrical discharge, plasma, pulse power and peripheral technologies will be established as required in response to the demand of each research field and society.

4. Committee members

Position	Name	Affiliation
Chairperson	Hiroki Kojima	Nagoya University
Vice-chairperson	Toru Sasaki	Nagaoka University of Technology
Primary member	Shigeru Adachi	Nissin Pulse Electronics Co., Ltd.
"	Satoshi Uchida	Tokyo Metropolitan University
"	Gaku Oinuma	Mitsubishi Electric Corporation
"	Douyan Wang	Kumamoto University
"	Takamasa Okumura	Kyushu University
"	Akinori Oda	Chiba Institute of Technology
"	Yoshimine Kato	Kyushu University
"	Toshiyuki Kawasaki	Nishinippon Institute of Technology
"	Masahiro Kozako	Kyushu Institute of Technology
"	Naoyuki Sato	Ibaraki University
"	Kazuhiro Takahashi	Muroran Institute of Technology
"	Nozomi Takeuchi	Tokyo Institute of Technology
"	Akira Tokuchi	Pulsed Power Japan Laboratory, Ltd.
"	Tomoyuki Hikosaka	Fuji Electric Co., Ltd.
"	Tomohiro Furusato	Nagasaki University
"	Megumu Miki	Central Research Institute of Electric Power Industry
"	Kiyoyuki Yambe	Niigata University
Secondary member	Ryuta Ichiki	Oita University
"	Yasushi Minamitani	Yamagata University
Secretary	Katsuyuki Takahashi	Iwate University
Assistant secretary	Yuki Inada	Saitama University
"	Yusuke Nakagawa	Tokyo Metropolitan University

(April 6th, 2022)

5. Investigating R&D Committees

- Investigating R&D Committee on Present State of Insulation in Increasingly Widespread Converter-fed Rotating Machines
- Investigating R&D Committee on Trends in Plasma Surface Technology
- Investigating R&D Committee on Food Sterilization and Processing Technology based on Pulsed Electric Fields