

# Comparative Study on Various Type of Lightning Arrester at Solar Farm



S. S. Wahdain, M. S. Hissam, and A. I. Mohamed

**Abstract** The Photovoltaic (PV) system is vulnerable to a lightning strike. This over-voltage from lightning strikes could potentially damage PV components, including inverter, cable and the panel itself. To cater this issue, a lightning protection system (LPS) had been installed throughout the solar farm area as a device to attract and assist lightning flow to the ground. Although a proper LPS system had been established, there are still incidents related to lightning strikes on the solar panel, ultimately causing severe damage to the overall PV system. This paper focuses on studying and simulating PV solar farms electrical field behavior in various lighting protection systems. Also, it analyses several types of LPS arrangement, PV panel mounting and construction toward the influence of the lightning electric field. The Finite Element Method (FEM) has been used for this research. The simulation results show that most of the lightning attachments affected the PV panel at the corner edge of each side. The sharp point at the edge creates nonuniform electric field and increases electric field intensity. This paper will suggest a design of PV and LPS systems for better prevention of lightning strike phenomena.

**Keywords** PV farms · Finite Element Method (FEM) · Solar lightning protection · Electrical field distribution · Striking points · Lightning rod · PV mounting

## 1 Introduction

Solar photovoltaic is considered one of the essential energy conversion technologies to support the global transition to clean energy [1]. Solar PV systems are typically installed in large, open areas for maximizing performance to prevent shading effects. Apart from that, this kind of open area installation will expose the solar PV panels during thunderstorms to the possibility of lightning strikes [2, 3]. Lighting can cause

---

S. S. Wahdain · A. I. Mohamed (✉)  
Fakulti Teknologi Kejuruteraan Elektrik Elektronik,  
Universiti Malaysia Pahang, Pahang, Malaysia  
e-mail: [amirizzani@ump.edu.my](mailto:amirizzani@ump.edu.my)

M. S. Hissam  
Petronas Chemical LDPE, Kemaman, Terengganu, Malaysia