International J.of Multidispl.Research & Advcs. in Engg.(IJMRAE),
ISSN 0975-7074, Vol. 3, No. II (April 2011), pp. 53-62

BREAKDOWN PHENOMENON IN SINGLE PHASE GAS INSULATED SUBSTATION IN THE PRESENCE OF METALLIC PARTICLE CONTAMINATION ON SPACER USING MONTE-CARLO TECHNIQUE

D. PADMAVATHI, J. AMARNATH, S. KAMAKSHAIAH AND G. CHANDRASEKHAR

Abstract

Compressed Gas Insulated Substation (CGIS), using SF_6 Gas as dielectric medium represents the leading technique in the construction of high voltage switching electric substation in densely populated urban areas because of space constraint .Since all the components of CGIS are enclosed in metal enclosure and properly earthed eliminating the possibility of accidental contact of maintenance personal with live parts of CGIS. Electromagnetic field effect to human and animals in the vicinity is also considerably reduced due to the shielding. However, the advantages of GIS are compromised at the cost of presence of metallic particle contamination which is inevitably present in the dielectric medium. Definitely the presence of such metallic particle contamination reduces the insulation integrity of GIS. Under applied electric field the metallic particulate may acquire charge and in case if the electrostatic force acting on the particulate is greater than the gravitational pull due to its mass, the particle gains motion. The charge acquired by the particle depends upon its size, shape and orientation. In this paper the metallic particulate is considered on the spacer inclined at an angle of 45° with respect to outer enclosure. Simulation is carried out by considering the metallic particulate of different material on the upper side of the conical spacer for 1-Φ power frequency voltages. Random behavior of the metallic particle is adequately simulated using Monte-Carlo technique. Results have been presented and analyzed in this paper.