

N. Matsuoka, Y. Fuchi, M. Kozako and M. Hikita, "Effect of permittivity variation on surface flashover of GIS epoxy spacer model in SF₆ gas," *2016 IEEE International Conference on Dielectrics (ICD)*, Montpellier, 2016, pp. 96-99.

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Abstract: This paper reports a new method of increasing surface flashover voltage on GIS epoxy spacer with incorporating nano/micro composites in SF₆ gas. Simulation on the electric field grading effect on the surface flashover voltage for a GIS insulator model is carried out with nano/micro composites. To confirm the field grading effect, experiments are conducted to measure surface flashover voltage on a GIS spacer model. As the result, it is shown that nano/micro composites have the field grading effect due to their low relative permittivity.

keywords: {SF₆ insulation;electric field effects;epoxy insulators;flashover;gas insulated switchgear;nanocomposites;permittivity;GIS epoxy spacer model;GIS insulator;SF₆;electric field grading effect;microcomposites;nanocomposites;relative permittivity

variation;surface flashover voltage;Discharges (electric);Electric fields;Electrodes;Flashover;Permittivity;Surface discharges;Voltage measurement;Field Grading Materials;GIS Epoxy Spacer;Lightning Impulse;Nano/microcomposites;SF₆;Surface Flashover},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7547552&isnumber=7547503>

G. Ban, L. Prikler, I. Fogarasi and I. Hajos, "Protection of MV covered conductor lines against overvoltages and fault arcs," *2005 IEEE Russia Power Tech*, St. Petersburg, 2005, pp. 1-7.

doi: 10.1109/PTC.2005.4524646

Abstract: Reduction of the line and tower dimensions is a common tool to insert overhead lines into the environment. Recently such trends occurred in the field of MV networks, as well. When applying covered conductors shorter phase-to-phase distances can be allowed than with bare conductors. Important application areas of covered conductor system are the lines passing through forests (allowing narrow corridor), inhabited areas or line crossing. This paper analyses the processes resulting in damaging the cover and conductor, reports on the laboratory studies aiming at selecting the suitable arc protecting devices, establishing their pros and cons. Authors report on the laboratory tests for understanding the complex flashover mechanism of the insulator-covered conductor arrangement. Follow current tests were carried on by thin wire arc initiation and in a synthetic circuit.

keywords: {arcs (electric);lightning protection;overvoltage;power overhead lines;MV covered conductor lines;arc protecting devices;complex flashover mechanism;fault arcs;insulator-covered conductor arrangement;overhead lines;overvoltages;Arc discharges;Circuit testing;Conducting materials;Conductors;Flashover;Insulation;Lightning;Poles and towers;Power system protection;Surge protection;MV overhead lines;arc protection;back-flashover;covered conductor;lightning induced overvoltages;surface discharge;synthetic testing},

URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4524646&isnumber=4524335>

K. Morales, J. Krile, A. Neuber, H. Krompholz and J. Dickens, "Pulsed Unipolar Surface Flashover at Atmospheric Conditions," *Conference Record of the 2006 Twenty-Seventh International Power Modulator Symposium*, Arlington, VA, 2006, pp. 174-180.

doi: 10.1109/MODSYM.2006.365210

Abstract: Dielectric surface flashover along insulators in vacuum has been comprehensively researched over the years. However, the primary mechanisms involved in dielectric flashover at atmospheric pressures have yet to be as extensively analyzed with variable parameters such as electrode geometry, background gas, humidity, and temporal characteristics of the applied voltage. Understanding the fundamental physical mechanisms involved in surface flashover at atmospheric pressures is vital to characterizing and modeling the arc behavior. Previous DC and unipolar excitation experiments have shown distinct arc behavior in air and nitrogen environments for an electrode geometry that produces electric field lines that curve above the dielectric surface. Specifically, flashover arcs in an air environment were observed to develop along the dielectric surface. Experiments conducted in nitrogen revealed that the arc developed along the electric field lines, above the surface of the dielectric. It was also of importance to alter the temporal characteristics of the applied voltage to simulate lightning situations and investigate the impact on the arc behavior and voltage delay times. A solid state high voltage pulser with an adjustable pulse width of ~500 ns at FWHM and amplitudes in excess of 30 kV was specifically developed to replicate the temporal characteristics of a voltage pulse observed when a building structure is hit by a lightning strike. Based on these results, the physical mechanisms primarily involved in pulsed unipolar surface flashover will be discussed. Additional studies regarding the effects of humidity and surface roughness on the flashover arc behavior will also be presented

keywords: {arcs (electric);atmospheric pressure;dielectric materials;flashover;humidity;insulators;lightning;nitrogen;surface discharges;30 kV;500 ns;air environment;arc behavior;atmospheric pressure;dielectric surface flashover;electric field line;electrode geometry;humidity;insulator;lightning situation;nitrogen environment;pulsed unipolar surface flashover;solid state high voltage pulser;voltage delay time;Dielectrics;Electrodes;Flashover;Geometry;Humidity;Lightning;Nitrogen;Rough surfaces;Space vector pulse width modulation;Voltage},

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