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Mayuri Desai

Modeling of Lightning Strikes

Visualization and Statistical Analysis Algorithms

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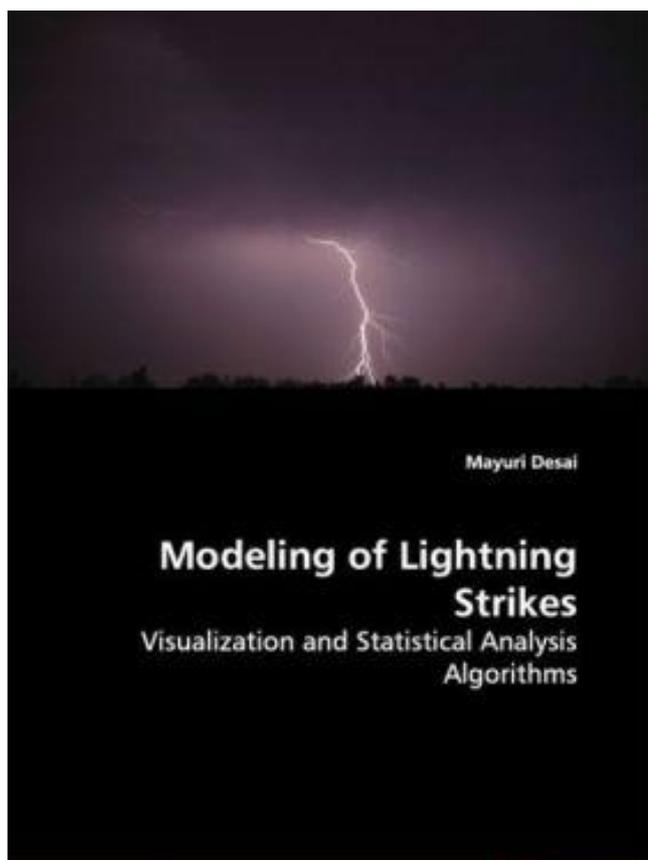
Beschreibung

Lightning has been a global phenomenon observed for thousands of years, and is yet not completely understood by scientists. It is the characteristic property of thunderstorms and even a slight rise in air temperature at ground level leads to a furious increase in the frequency of lightning during thunderstorms. Lightning is becoming the leading cause of weather related personal injuries; hence, the study of lightning strike behavior with respect to various parameters like strike time, geographical distribution, and strength, apart from its electromagnetic wave characteristics, has always been a very challenging and interesting field to explore. This book provides various new visualization and statistical analysis algorithms developed to study lightning strike data in a variety of ways with

respect to strike time, strength, and location. These algorithms will definitely serve as a new insight for upcoming students and research scientists to explore the unknown facts of lightning strikes for improving lightning protection on a global scale.

Lightning is one of the most visually impressive and frequently occurring natural phenomena on Earth. However, very few people actually have a solid understanding of what causes lightning, how it works, and why it occurs. This model attempts to illustrate lightning strikes from beginning to end at the very low level of.

The main aim of this PhD work is to advance tall-structure lightning return-stroke current modelling. The Alternative Transients Program (ATP), a version of the Electromagnetic. Transients program .. when electromagnetic fields radiated by remote strikes couple with sensitive electronic loads or power distribution lines [3],.

NASA Develops Wireless Sensors to Detect Lightning Strike Damage to Composite Aircraft Computational electromagnetic software enables a small team of researchers at NASA's Langley .. One team member was designated to create computational models of the sensor as well as material models of composite layers.

4, OCTOBER 2000. 1175. EMTP Modeling of a Triggered-Lightning Strike to the Phase Conductor of an Overhead Distribution. Line. Carlos T. Mata, Student Member, IEEE, Mark I. Fernandez, Vladimir A. Rakov, Senior Member, IEEE, and. Martin A. Uman, Fellow, IEEE. Abstract—A triggered-lightning experiment and EMTP.

14 Nov 2014 . CAPE times precipitated water mass to discharged lightning energy with an efficiency of. 1%. When this proxy is applied to 11 climate models, CONUS lightning strikes are predicted to increase $12 +\_ 5\%$ per degree Celsius of global warming and about 50% over this century. Lightning exerts a powerful.

The precursor of any lightning strike is the polarization of positive and negative charges within a storm cloud. The tops of the storm clouds are .. Lightning researchers are now generally convinced that the lightning dissipation theory provides an inaccurate model of how lightning rods work. It is indeed true that the tip of a.

(2003a) analyzed the possibilities of the numerical modeling of nitrogen oxides formed due to lightning strikes using the 2-D version of the model that simulates an electrization of the storm. It is supposed that the formation of NO is determined by a dissipation of energy whose value is calculated from the value of the electric.

Thunderstorm Electrification Modeling and Lightning Data Assimilation in Mesoscale Models . storms from aircraft penetrations and balloon soundings, lightning location and structure from

a three-dimensional lightning mapper, lightning strikes to ground from a national network, and radar-derived airflow and precipitation.

14 Jul 2007 . On return stroke currents and remote electromagnetic fields associated with lightning strikes to tall structures: 2. .. to test and validate return stroke models and theoretical expressions, presented in part 1 [Pavanello et al., 2007], relating far field peaks to current peaks for lightning strikes to tall structures.

Abstract: A multidirectional, carbon fiber/epoxy, composite panel is subjected to a simulated lightning strike, within a finite element method framework, and the effect of material properties on the failure (delamination) response is investigated through a detailed numerical study. The numerical model of the composite panel.

28 Aug 2015 . Lightning activity is projected to increase with climate change. Lightning activity is interesting to model with stochastic gradient boosting (GBM: generalized boosted regression models/gradient boosting machine) in R. One use I have for this at SNAP is in the context of landscape fire modeling with SNAP's.

24 Feb 2006 . calculations. [3] Engineering return-stroke models are equations relat- ing the longitudinal current along the lightning channel at any height and any time to the current at the channel origin. (the origin is usually situated at ground level, but can be at the top of a tall grounded strike object [e.g., Rachidi et al.,.

of dry lightning at 12-kilometer resolution. • Similar forecasts were developed to predict the daily probability of dry lightning strikes over Alaska at 10-kilometer resolution. Results compared well with observed strikes. • Dry lightning is not much of a factor in Alaska. Therefore, a successful model of wildfire risk involves just.

Title: Modeling Lightning Impact Thermo-Mechanical Damage on Composite Materials. Authors: Muñoz, Raúl; Delgado, Sofía; González, Carlos; López-Romano, Bernardo; Wang, De-Yi; LLorca, Javier. Affiliation: AA(IMDEA Materials Institute), AB(Fundación para la Investigación, Desarrollo y Aplicación de Materiales.

In this chapter, we present a review of recent progress in the modelling of lightning strikes to tall structures. Since some tall structures are struck by lightning several tens of time per year, they can be used as ground-truth to measure and calibrate the location accuracy of lightning location systems. In addition, knowledge of.

The modern approach to lightning protection is to build a simulation model of the aircraft. This model provides a .. Direct Effects Panels (ARP5416) Direct lightning attachment to panel surfaces to demonstrate acceptable damage: -No strike puncture -No significant loss of mechanical strength -No hot spot formation

When building finite element models, sharp edges can lead to local singularities and fields that are nonconvergent with mesh refinement. Rounding off these sharp edges by adding a fillet avoids this singularity. As it turns out, in many multiphysics models, these sharp edges and the resultant singularities do not necessarily.

Abstract: Lightning strike, fire weather, and fire occurrence data were used to model (i) the probability that a light- ning strike causes a sustainable ignition on the forest floor and (ii) the probability of an ignition being detected and re- ported to the fire management agency for each ecoregion in the province of Ontario.

26 Oct 2016 . An observation-based parameterization scheme: using the monthly mean NLDN data to constrain the lightning strikes over the domain and distribute the total lightning strikes to the local grid cells by relating NLDN strikes to grid-level RC values. Two Practical Scenarios for Modeling Lightning NOX.

4 Jul 2017 . Request (PDF) | Modeling lightning s. | The modeling of lightning strike behavior and estimation of the subsequent electric discharge is of great practical importance. In this

study, a complete two-dimensional physics-based analytic formulation is presented for elevated grounded systems that can be.

27 Apr 2017 . The parameters are obtained solving by least squares the equation The model parameters are estimated by comparing the total seasonal convective precipitation accumulation with the total lightning strikes accumulated per grid. At this point, all the research relating LPR had correlated precipitation with.

14 Aug 2015 . From the physical modelling of lightning discharge, Onera has developed a general method to compute a probabilistic zoning. This method takes into account the fundamental processes occurring during a lightning strike on an aircraft. The attachment process is computed from the aircraft geometry and the.

This paper aimed to model lightning strike events and evaluate its correlation with power outages in a Nigerian power distribution system. A specified coastal distribution network of southwest Nigeria was selected as a case study. Zone-specific records of cloud-to-ground lightning strikes for 84 months were obtained from.

Army lightning injuries/fatalities) come from indirect effects of nearby lightning strike. The two prominent effects are step potential and flashover. 2.3.1 Step Potential Hazards. We can expect a significant voltage difference near the point where lightning current enters the earth. In figure. 5 we model the current injected flowing.

Lightning strikes to aircraft have been a threat for many years. Intensified research programs for studying strikes to fixed wing aircraft have increased the knowledge and decreased the dangers of catastrophic effects on these types of aircraft. However, less research has been performed on lightning strikes to helicopters.

Forecast models that are able to ingest Doppler radar, lightning or satellite data of thunderstorms improve predictions of thunderstorms and associated severe weather. . They found that 80% of the next lightning strikes in a storm are within 2 to 3 miles of each other in certain weather conditions in Florida, but more typically.

15 Sep 2017 . During a lightning strike, currents of up to (and even greater than) 200,000A travel between the cloud and the object where the lightning channel formed. . Utilizing numerical simulation, electromagnetic models for wind turbine blades can be developed to analyze distributions between structural carbon,.

The results of full-scale experiments of lightning current flow through soil are presented. With the pulse high voltage generator the current of several tens of kiloamperes amplitude was created in soil on the length up to 70 m. The measured current and voltage profiles, the calculation of resistance and its profile between.

20 Mar 2015 . Abstract—This paper investigates on the characteristics of current when lightning strikes on the conductor of transmission lines. The impedance of multistory model based on the 115 kV transmission tower is employed to simulate in EMTP/ATPDraw program. The location of lightning strikes on the conductor.

for their invaluable help with the modeling of results from the nearby strike experiments and for the pleasure of working with . 1999 FPL Experiment, Direct Lightning Strike Interaction with a. Horizontally-configured ... Modeling of Induced Currents on the Test Line due to Nearby Lightning .248. 6.8. Lightning Currents.

Modeling of Lightning Strikes: Visualization and Statistical Analysis Algorithms by Mayuri Desai and a great selection of similar Used, New and Collectible Books available now at AbeBooks.com.

10.1098/rspa.2001.0906. Assessment of protection system positioning and models using observations of lightning strikes to structures. By N. I. Petrov1 and F. D'Alessandro2. 1All Russian Electrotechnical Institute, 19{39 Lenina Str.,. Istra, Moscow Region, Russia. 2ERICO

Lightning Technologies, GPO Box 536, Hobart,.

tests, thermodynamic tests as well high-voltage tests that simulated lightning strike. PRELIMINARY CALCULATIONS. Before starting the synthesis of the conducting composite material several numerical studies were performed in order to model the desired properties of the resulting mixture. These numerical studies were.

Lightning strikes kill about 10000 people every year and causes billions of dollars of damage to property. Despite its crucial importance and being studied for hundreds of years, lightning is still poorly understood. The fundamental difficulty is the wide range of physics that is involved: electromagnetism, atomic physics,.

level of lightning and HIRF protection. The level of protection for each aircraft model in the database was categorized as no protection, avionics protection, or full protection. The study found that fully protected aircraft had a significantly lower percentage of electrical failure and interference due to lightning strikes when.

Results from these simulations are then compared with those found from analysis of real lightning strike data taken from wind turbines and windfarms across the world. Index Terms-- Lightning, wind turbine, finite element, modeling, electric field. I. INTRODUCTION ind turbines being developed offshore are increasing in.

The electrogeometric model of lightning attraction to structures is used in combination with the log-normal .. existing ones, requires analytical tools to strike an economic balance of construction and equipment costs . has been confined to cover aspects of direct strikes to transmission lines only. The second category, dealt.

The Community Multiscale Air Quality Model (CMAQ) parameterizes the lightning NO emissions using local scaling factors adjusted by the convective precipitation rate that is predicted by the upstream meteorological model; the adjustment is based on the observed lightning strikes from the National Lightning Detection.

investigation of certain cases. Modeling lightning strike effects. Lightning strikes are inevitable when an high voltge (HV) substation is supplied by overhead transmission lines →1. The lightning can hit either the phase wire (direct stroke) or the shield wire, causing backflash over the insulator string. Voltage magnitudes can.

25 Nov 2014 . However, it is possible to obtain simple models adjusted to an overall behavior observed in tests and measurements. This paper aims to present the models development and a sensitive evaluation of overvoltage at LVPI entrances, in the case of a direct lightning strike to the medium voltage (MV) network,.

the lightning EM fields at different distances from the strike point and different heights above the ground be computed. This modeling and simulation involves following steps: – Modeling channel base current of the lightning stroke;. – Modeling of lightning return stroke current through return stroke channel;. – Computing the.

Abstract. The results of full-scale experiments of lightning current flow through soil are presented. With the pulse high voltage generator the current of several tens of kiloamperes amplitude was created in soil on the length up to 70 m. The measured current and voltage profiles, the calculation of resistance and its profile.

8 Jul 2015 . Abstract: The problems related to electromagnetic waves transmitted by lightning strikes can be studied through physical lightning models based on laboratory results. The main concern of these models is determining the striking distance between the leader tip and the lightning rod during lightning.

Having an understanding of the typical effects of lightning strikes and proper damage inspection procedures can prepare operators to act quickly when a lightning strike is reported to ... Maintenance personnel should consult chapter five of the Aircraft Maintenance Manual

(AMM) for the airplane model being inspected.

Only one sample contained evidence of reduction by carbon, and the results support the reduction of Fe as intrinsic to the rapid, high temperature processing during lightning strikes.A thermodynamic modeling code is used to model the formation of moldavite tektites and the reduction of Fe from sediments around the Ries.

Modeling of Lightning Strikes: Visualization and Statistical Analysis Algorithms [Mayuri Desai] on Amazon.com. *FREE* shipping on qualifying offers. Lightning has been a global phenomenon observed for thousands of years, and is yet not completely understood by scientists. It is the characteristic property of thunderstorms.

United States Department of Agriculture, Forest Service, "A Model for Predicting Lightning-Fire Ignition in Wildland Fuels" (1979). Wildfires. .. ning ignition model that could provide the basis for a lightning-caused fire occurrence index within ... It is known that lightning strikes the ground both inside and outside of the rain.

Lightning Risk Score enables underwriters to determine localized lightning risk using a comprehensive analysis of historical data. Referencing historical data (2005-2012) from WSI's proprietary lightning network, Lightning Risk Score provides a highly accurate assessment of the typical threat for lightning strikes at any.

charged. Lightningporn the negatively charged area of the cloud generally carries a negative charge to Earth and is called a negative flash. . Figure 1. The Lightning Model. JAAER Fall 2005. Page 43. 3. Golding: Lightning Strikes on Commercial Aircraft: How the Airlines Are Co. Published by ERAU Scholarly Commons,.

@article{6f9df02f31ba47cba9c19b83a50be67e,. title = "Modeling of flashover arcs in medium voltage networks due to direct lightning strikes",. keywords = "Lightning overvoltages, Medium voltage line, Flashover arc, Dynamic arc model, ATP-EMTP, Lightning overvoltages, Medium voltage line, Flashover arc, Dynamic arc.

14 Nov 2017 . higher risk of direct lightning strikes, it provides little information about the path that the discharge will follow and the eventual strike point. Therefore, a more sophisticated method needs to be developed. This paper studies the streamer formation and propagation on wind turbine blades by means of.

Find out how and why the physics of lightning discharge is in fact a mutliphysics problem in terms of research and engineering simulations.

30 Nov 2008 . Modeling of Lightning Strikes, 978-3-639-09997-3, Lightning has been a global phenomenon observed forthousands of years, and is yet not completelyunderstood by scientists. It is the characteristicproperty of thunderstorms and even a slight rise inair temperature at ground level leads to a furiousincrease.

The characteristics of these discharges are not well understood, but have been the subject of some theoretical analysis (e.g., Thum et al., 1982) and of considerable discussion, particularly in the context of modeling lightning strikes to power lines where the attachment process plays a significant role in the design of.

19 Nov 2017 . A Multiphysics Simulation Approach for Efficient Modeling of Lightning. Strike Tests on Aircraft Structures. Abdelal, G. F., & Murphy, A. (2017). A Multiphysics Simulation Approach for Efficient Modeling of Lightning. Strike Tests on Aircraft Structures. IEEE Transactions on Plasma Science. DOI: 10.1109/TPS.

30 Mar 2008 . The mechanism behind different types of lightning may now be understood, thanks to a combination of direct observation and computer modeling. Most people see lightning strikes that go from clouds to the ground, but some lightning goes upward, forming blue jets and gigantic jets. Perhaps the most.

In this paper the frequency domain Modeling of a multiconductor line illuminated by a nearby

lightning stroke is described, considering also variations of the line parameters along its length (nonuniform line case). Modeling of the illuminated line is based on Taylor's formulation, while the incident electromagnetic field is.

To predict the thermal response and thermal ablation in the composite structure due to lightning strike, a physics-based model describing surface interaction between the lightning channel and the composite structure has been developed. The model consists of: (i) spatial and temporal evolution of the lightning channel as a.

1 Jan 2008 . Florida is the lightning capital of the United States. Lightning strikes occur when electrostatic energy within storm conditions is unbalanced and ephemeral discharges of static electricity are set off to help the system find equilibrium. Lightning, meaning the number of lightning strikes per month,.

A distributed parameters line model is employed, with. Heidler's type surge current source representing direct lightning strike to the telecommunication tower. The mathematical model elaborated for the ATP Draw characterized by loss lines with distributed constant parameter, which is based on the single phase Clark's.

8 Sep 2016 . from a lightning strike on a shielding (ground wire) wire. Both events . A lightning overvoltage study requires the detailed modeling of the . Lightning Studies. Direct strike on a phase conductor: This is due to 'smaller' lightning strokes that escape the shielding. Typically, the magnitude of the lightning.

11 Feb 2016 . Modeling of a Lightning Strike to a Car can be performed using Chronos time domain solver.

Abstract. This paper considers the issue of direct and indirect effects of lightning strikes on aircraft. It is proposed to study electromagnetic fields and interferences that affect aircraft instruments based on the theory of large-scale experiment. Keywords. physical modeling lightning strike aircraft electromagnetic interference.

The Modeling of Lightning Strikes. Lightning strikes most commonly occur in clouds: either inter- or intra-cloud or cloud-to-ground. . A time-domain H-field monitor was used to record the surface currents due to the lightning strike.

14 Nov 2014 . And the new model suggests climate change is going to increase lightning incidence by 50 percent.

12 May 2017 . Elkalsh, Ahmed and Sewell, Phillip and Benson, Trevor M. and Vukovic, Ana (2017) Coupled electrothermal two-dimensional model for lightning strike prediction and thermal modeling using the TLM method. IEEE Journal on Multiscale and Multiphysics Computational Techniques, 2 . pp. 38-48. ISSN 2379-.

1 Jun 2015 . Tesla's been pretty adamant for a while now that lightning is no unusual hazard to its all-electric Model S, any more so than lightning is a hazard to any regular car. But what looks to be a freak occurrence just captured on video shows that a bolt from the sky can, indeed, at least screw up your Tesla Model S.

Keywords: Lightning; Return strokes; Electromagnetic compatibility; Modelling; Electric fields;. Magnetic fields. 1. . Several researchers included an upward connecting leader in their lightning models. [8–11,28–30]. ... case of lightning strikes to tall towers, the connecting leader is likely to develop before the streamer zone.

24 Apr 2011 . how do I model lighting strike. Learn more about modeling, wind.

Models for the charge buildup which leads to lightning discharges suggest a buildup of a strong negative charge layer near the bottom of the cloud and the . In a medium which could be classified as "nonlinear", implying that it doesn't follow simple proportionalities, the path of the lightning strike is not predictable in practice.

questions on the characteristics of lightning return-strokes to tall structures and their associated

electromagnetic radiation. Chapter 2 presents a review on recent progress in the modeling of lightning strikes to tall towers and associated experimental data obtained during the last decade or so. Two types of return stroke.

Abstract. Defining·the electromagnetic environment inside a graphite composite fairing due to near-by lightning strikes is of interest to spacecraft developers. This effort develops a transmission-line-matrix (TLM) model with a CST. Microstripes to examine induced voltages.on interior wire loops in a composite fairing due to a.

15 Oct 2012 . Modelling lightning strikes to tall towers. Rachidi, Farhad; Rubinstein, Marcos Editor: Cooray, Vernon. Published in: Lightning Electromagnetics (ISBN: 978-1-84919-215-6), p. 873-916; Series: Power and Engineering Series; London, UK: IET, 2012.

Simulation predictions are compared against published experimental data, illustrating the potential accuracy and computational cost of virtual lightning strike tests and the requirement for temperature dependent material modelling. The modelling procedure is then used to examine and explain a number of practical.

26 Aug 2017 . model of the lightning leader (a discharge mode in early formation of lightning), the Chinese Academy of Meteorological Sciences [10] simulated the characteristics of lightning strikes on wind turbines and analyzed the impact of lateral distance of the lightning downward leader from the wind turbine, and the.

Monte Carlo Simulation of Lightning Strikes to the Nelson River HVDC. Transmission Lines. S. J. Shelemy and D. R. Swatek. System Planning Department, Manitoba Hydro. P.O. Box 815, Winnipeg, Manitoba R3C 2P4. CANADA. Abstract - A Monte Carlo model of the lightning performance of Manitoba Hydro's Nelson River.

This type of waveform is typically used for modeling lightning strikes [10]. III. COMPUTER SIMULATIONS. The CDEGS sofiware first uses .a forward FFT to decompose the time-domain lightning surge of Fig. 3 into its frequency spectrum. it then selects a fmite number of frequencies from this spectrum, based on the.

1 Dec 2016 . But understanding these dynamics is critical to modeling the frequency of lightning strikes at wind farms, and the High Voltage Lab is working to verify theoretical and computational descriptions of this phenomenon. In 2015 wind power provided 42 percent of the electricity Denmark consumed.

11 Dec 2017 . Data from thousands of past storms help guide a new forecast model that predicts where and when lightning may hit.

AL05-06. 1. Lightning Hazards to Aircraft and Launchers. Experimental Studies of Lightning. Strikes to Aircraft. P. Laroche, P. Blanchet,. A. Delannoy †, F. Issac. (Onera) . Damages to aircraft due to lightning strike were frequently noticed; they range from arc spots .. The model instrumented by NASA was operated in 1976.

F. A. M. Rizk, Modeling of substation shielding against direct lightning strikes, IEEE Trans. Electromagn. Compat., Vol. 52, No. 3, pp. 664675, 2010. K. L. V. Dung, Lightning protection systems design for substations by using masts and Matlab, International Journal of Mathematical, Computational, Physical, Electrical and.

In all Ph.D. projects, the candidates will be exposed to satellite observations, ground observations, laboratory experiments and numerical modelling, and all .. The objective is to investigate of the mechanism of high-energy emissions produced from lightning strikes to ground and its possible relations on the source of.

reasonable selection of the tower model in the calculation of back- strike intruding wave is very important. 1 Introduction. 500kV substation is the pivot of power system, and its performance is very important to power system. Lightning stroke in substation may lead to a lot of damage to electrical equipment. Hence, it is very.

ABSTRACT. Cloud-to-ground lightning strike events are a common source of wildfire ignition. In. Southeast Idaho, most lightning-ignited wildfires occur during the summer and early fall. During this time, large areas of hot, high pressures zones occur within the basin and range topography of the Intermountain west.

Smart Intelligent Aircraft Structures. Modeling of Lightning Strike. Damage in Polymer Matrix. Composites. Ankara, Turkey. 25/09/2014. Omer Soykasap, Sukru Karakaya,. Mehmet Colakoglu, Yelda Akcin. INTAAC'14, 1st International. Aeronautics and Astronautics. Conference.

ATIL-F model will be reviewed. In Section 3, the cylindrical 2D-FDTD method and its related considerations are described. The simulation results and discussions are presented in Section 4. Finally,. Section 5 deals with conclusions. 2 - LIGHTNING CHANNEL MODELING. The electromagnetic return stroke models allow a.

The direct impact of a lightning strike at electrical systems and living beings can lead to destruction of system elements, equipment and eventually death.

After I wrote about a group from EPFL, Lausanne, Switzerland in a previous blog post, "Modeling Lightning Strikes is a Multiphysics Problem", I checked to see if anyone from this group has presented at our conferences. It was great to find that Dr. Abdolhamid Shoory in fact has done so, with a paper titled: "Using COMSOL.

The modeling of lightning strike behavior and estimation of the subsequent electric discharge is of great practical importance. . Regions of high risk to lightning strikes on the grounded structure are developed in terms of joint probability functions.

3 May 2014 . lightning shielding system is a high priority in order to defend electric power grids. To achieve this objective, different techniques have been used to estimate lightning strike distance to grounded objects and the design of shielding system. 1.1. Electro-geometric model (EGM). The Electro-geometric model is.

Lightning direct effects degradation of composite material depending on paint thickness. Fabrice Tristant, Fabian Fustin (1068). 1A1-5. A numerical study of the pressure applied on CFRP panels during a lightning strike using a coupled electro-thermal-mechanical model. Christine Espinosa, Thomas Montel, Jose Francisco.

Rizk, Farouk A.M. Modeling of Lightning Incidence to Tall Structures Part II: Application, IEEE Transactions on Power. Delivery, Vol. . Lightning strikes to wind turbines is an important problem for wind turbine manufacturers and wind . Network (NLDN) allows wind farm operators to identify potential lightning strikes and.

22 Jul 2017 . [4] Abdeal G., Murphy A., Nonlinear numerical modelling of lightning strike effect on composite panels with temperature dependent materials properties, Composite Structures, 109, 268-278, 2014.Google Scholar. [5] Katunin A., Krukiewicz K., Preliminary analysis of thermal response of dielectric and.

24 Feb 2012 . A semi-quantitative estimate of the risk of lightning strike interception by an aircraft can be obtained from the concept of attractive area as used in lightning protection standards for ground structures, which can also be derived from lightning models (Petrov & Waters,. 1995). For a grounded structure of the.

CFC plates subject to simulated lightning strikes (document D4.4) .... 68. Q. Recommended rise times for direct effect test (document D5.1a)...... 70. R. Modelling of transfer function : coupling mechanisms (document D5.1b) .. 72. S. Modelling of transfer function : network modelling analysis (document D5.2a.

In a model used by Knowles (1993), a halving of the albedo over burned vegetation areas increased convection and resulted in the formation of a mesoscale circulation system. In this

paper we explore the spatial and temporal patterns of lightning strikes in northern Australia, for the first time, and the possible relationships.

strikes a tall object are derived based on continuity equation and current expressions given by the series point current source model representation of the tall object and lightning channel. Validation of charge density expressions was performed by comparing the total vertical electric field at ground level calculated by the.

Test the established time domain models with lightning impulse. . that frequency - dependent models created by this method can be used in EMTP programs. .. When the lightning strikes a point, the voltage developed is the lightning discharge current multiplied by the impedance of the system as seen by the lightning.

flash probability predicted by the model are in excellent agreement with empirical formulae based on extensive field observations. REFERENCES. [l] F.A.M. Rizk, "Modeling of Lightning Incidence to Tall Structures. Part I: Theory", submitted for presentation, IEEE Winter Power Meeting,. 1993. 3. The model confirms that strike.

Effect of vertically extended strike object on the distribution of current along the lightning channel. Journal of Geophysical Research, 107 (D23): 4699, doi:10.1029/2002JD002119. Rachidi, F. (2007). Modeling lightning return strokes to tall structures: a review. Journal of Lightning Research, 1: 16–31. Rakov, V. A., and.