BrcLightning - Risk Analysis and Scaling for Protection against Atmospheric Discharge

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I. INTRODUCTION

The revision of Brazilian Standard NBR 5419 in part 2 incorporated the risk analysis in accordance with International Standard IEC 62305 also in part 2. In order to meet this demand and those requirements BRC designed and developed the BrcLightning in the form of a database, as well as it provides modules for design, evaluation and scaling of LPS using the mathematical approach methodology.

At the moment, it is developed in ACCESS, using VBA language, with the goal of allowing it to run on Windows and on the Internet.

The Risk Analysis of consists of 5 sections: 1. Registration Module; 2. Zones Registration Module; 3. The setting data of the connected lines and Zone.; 4. Risk Analysis Factors Module and 5. Results Module.

II. SOFTWARE DEVELOPMENT

A. Risk Analysis Module

1. Registration Module

The first part is related to Risk analysis. In section number one you will find the place to input all the registration data. Here will be all the information about the project and the location, like shown in Fig. 1. This section also defines how many Zones the structure will be due to risk analysis purposes. The designer can select from one to five zones.

2. Zones Registration Module

In section two, the designer enters the information for each zone that has been established for Risk Analysis.

Therefore, this section depends on the definition of section one, as shown in Fig. 2.

3. The setting data of the connected lines and Zone.

Section three brings the space to enter information on power lines and telecom lines: how they connect to the location. The designer also can enter the protective measures due to touch and step voltage and other mitigating measures in Zones, as shown in Fig. 3.

4. Risk Analysis Factors Module

In section four you will find the final results. Here you will generate the final report that you can print, as seen in Fig. 5.

5. Results Module

In section five you will find the final results. Here you will generate the final report that you can print, as seen in Fig. 5.

B. Rolling Sphere Module

1. Section for dimensioning h or d

In the first section, you can calculate the protected horizontal distance at ground level or on a reference surface when the height of the LPS is known. Also, you can calculate the height of the LPS to protect a given horizontal distance, as shown in Fig. 7.

2. Section for Scaling the Isolated LPS

In this section the height of the isolated LPS is scaled (the mast is isolated from the structure to be protected), based on the required LPS Class, the desired coverage margin. Also incorporates the scaling option for structures with and without hazardous areas and calculates the limits of this project, as shown in Fig. 8.

3. Coverage Radius Sizing Section of LPS

In section three, you can calculate the coverage provided by the existing LPS based on the standards and the selected level of protection as shown on Fig. 9.

4. Section of evaluating the Limits of an Installed LPS

In the last section of the Rolling Sphere Module, you can assess whether a particular LPS provides the correct protection based on the points used for the analysis, and whether its coverage interacts with other structures in the neighborhood, as shown on Fig. 10.

C. Angle Method Module

1. Sizing of height or distance

In the first section, you can calculate the protected horizontal distance at ground level or on a reference surface when the height of the LPS is known. Also, also allows you to calculate the height of a given LPS when the horizontal protected distance is known, as shown in Fig. 11.

2. Sizing of Isolated LPS (Angle Method)

Section two calculates the size of the LPS for a certain level of protection, based on the angle method. The software contains a visual orientation to facilitate the observation of the best solutions on LPS sizing based on the input, as shown in Fig. 12.

3. LPS Protection Check

Section three verify the effective evaluation of the LPS protection. This can be done in various points of the system, saving the record in the database, as shown in Fig. 13.

This software has many advantages. The software avoids errors that the professional may make during the process. Also, it calculates the results fast and produces the report easily. It is possible to simulate solutions and, since the software is a database, you can analyze the history and simulate statistical data and produce many reports based on it. This way, the professional will save time in the process and show reliable results based on the main standards.

III. CONCLUSION