Algorithmic Solution of Luminaries Placement - Reflections and Symmetry Issues

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***Abstract*—The paper deals with lighting road design. The demands on illuminance are defined in standard ČSN EN 13201 in case of Czech Republic. There are several parameters that a designer can change to get the optimal solution to fulfill the standard. The distance between pillars, their heights, the lamp overlap and tilt have to be defined. Such number of parameters make the optimization difficult. This paper solves the optimization via genetic algorithm. The fitness function that is convergent to good solutions is a vital point for this type of algorithms. The paper shows that solutions found by the genetic algorithm fulfill the demands and it also shows the way, how the fitness function can be created.**

Keywords - genetic algorithm, lighting, design, illuminance

I. Interior Lightening Design Issues

II. Photometric Value Calculation

III. Algorithm Description

IV. Symmetric Solutions

One of the requirements to the output design was to get the symmetric solutions of luminaire placement. There seemed to be two approaches how this might be done. The First counts with introduction of the symmetry in the fitness function. On the basis of the fitness equation evaluation the algorithm can prefer symmetric solutions more than others. Unfortunately this approach was very difficult due to unknown function that could describe how good is the symmetry of the luminare placement. Best experience came from using least squares method. After adding the sum of squares of the differences from the average value of ilumminance, a lot of output results showed the symmetry towards axis or center. However some types of luminous intensity distribution curves were very sensitive to create a tight groups of lamps in specific positions. This type of solutions were unable to realize in real conditions. Authors chose eventually the second approach dealing with introduction of the symmetry in the dna.

V. Program Behavior

dva typy symetrie. Pro stredovou jsou vysledky vice kreativni. Velka souvislost mezi delkou DNA a nastavenou mutaci. Pro velkou mutaci program spatne konverguje. optimalne je pro 200 0.01

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VI. Results in Program Building Design

VII. Conclusion

Here comes conclusion.

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