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ALGORITHM FOR THE CONDUCTOR LENGTH CALCULATION IN INCLINED AND LEVELLED SPANS BASED ON THE PARABOLA MODEL

SUMMARY

This paper shows a complete mathematical solution for calculation of the conductor length using integral calculus. The presented method is based on the parabola model and is applicable for spans approximately up to 400 metres, i.e. in those cases when the difference between the catenary and the parabola is negligible, and so the catenary can be approximated by a parabola. The algorithm is prepared for inclined spans, but it is also usable in levelled spans. Since the conductor length changes with temperature, each calculation refers to a chosen temperature of the conductor, using the maximum sag concerned to that temperature, beside the chosen tension and conductor type. Hence, the maximum sag of the parabola is one of the input data for the calculation.

Beside the conductor length calculation in a full span the provided algorithm also gives a possibility to calculate the conductor length in an arbitrary part of the span. Thus, it can solve classical tasks in practice, but also some unconventional ones. The use of the algorithm and its universal formula are presented in different types of the span.

Key words: inclined span, sag, parabola, overhead lines, vertex point

ALGORITAM ZA IZRAČUN DULJINE VODA U KOSOM I RAVNOM RASPONU ZA MODEL PARABOLE

SAŽETAK

Referat prikazuje cjelovito matematičko rješenje za izračun duljine voda uporabom integralnog računa. Prikazana metoda se zasniva na modelu parabole i može se primjenjivati za raspone do oko 400 metara, tj. u onim slučajevima kada je odstupanje između lančanice i parabole zanemarljivo, te se lančanica može aproksimirati parabolom. Algoritam je izrađen za kose raspone, ali se također može primjenjivati i za ravne raspone. Obzirom da se duljina voda mijenja sa temperaturom, svaki izračun se odnosi na izabranu temperaturu voda, uz uporabu najvećeg provjesa za tu temperaturu, izabrano naprezanje i tip vodiča. Stoga, najveći provjes parabole je jedan od ulaznih podataka za proračun.

Pored izračuna duljine voda u cijelom rasponu izrađeni algoritam također pruža mogućnost izračuna duljine voda u prizvoljno izabranom dijelu raspona. To znači da riješava klasične, ali također i neke nekonvencionalne zadatke u praksi. Uporaba algoritma i njegove univerzalne formule je prikazana u različitim vrstama raspona.

Ključne riječi: kosi raspon, provjes, parabola, nadzemni vodovi, tjemena točka