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HUMAN EXPOSURE TO POWER FREQUENCY ELECTRIC FIELD INSIDE VERY HIGH VOLTAGE SUBSTATIONS

Ioan T. Pop¹, Vasile Topa¹, Calin Munteanu^{1*}, Adina Racasan¹, Emil Merdan²

¹Technical University of Cluj-Napoca, Department of Electrotechnics, 26-28 G. Baritiu Street, 400027 Cluj-Napoca, Romania

²Electrica Distributie Transilvania Nord Electricity Distribution Company, 28A I. Macelaru Street, 4010380 Cluj-Napoca, Romania

Abstract

This paper outlines the most recent developments regarding the electric field distribution analysis inside very high voltage substations. The study was performed in order to develop and validate a powerful computation tool able to determine and predict the substation zones where the occupational exposure limits exceeds the admissible values imposed by the legislation. The study cases proposed in the paper are taken from the Romanian national power grid but the conclusions and the mitigation ideas outlined can be directly extended to substations belonging to other national or local power grids. In the first part of the paper the principles and methods proposed by the authors for the electric field computation in the vicinity of the power devices composing a very high voltage substation are outlined. The validation of the computation module implemented was done by comparisons with detailed experimental measurements results performed inside a new rehabilitated 400 kV substation. The evaluation of the results outlines a good agreement between the computed and measured electric field values inside the analyzed substation. This fact motivates the usage of the computation module developed in the design of the future high voltage substations in the light of fulfilling the actual regulations regarding the human exposure to power electric fields. In the second part of the paper scenarios to reduce the field values inside the future designed or rehabilitated substations are proposed and examined. The final conclusions end the paper.

Key words: computation, electric field, HV substations, measurements, mitigation techniques

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* Author to whom all correspondence should be addressed: e-mail: Calin.Munteanu@et.utcluj.ro; Phone: +40-264-401244; Fax: +40-264-592903