Comparative Analysis Between Stationary and Dynamic Parameters of a Synchronous Generator, with the Main Variable of the Air Gap Magnetic Induction

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Abstract— This paper presents a comparison between the stationary and dynamic parameters of a synchronous generator depending on the air gap magnetic induction. To perform this comparative analysis it was necessary to classical designing and optimal designing of the synchronous generator. The classical designing followed the steps indicated in specialty literature, and to reduce the designing time and for more accurate a designing program was created using MathCad software. The optimal designing was achieved using the same relationships as those used for the classical designing and optimization program written in MathCad [5]. This program has as an imported function a minimum cost of the generator. Its main variable is the air gap magnetic induction, B_δ. Thus, after several iterations, the program returns the optimal value of the air gap magnetic induction, leading to the fulfillment of the objective function value. The program also generates the necessary graphs for the analysis influence of the main variable variation upon the different parameters of interest. In this paper we present the influence of the air gap magnetic induction on stationary and transient parameters, namely: the longitudinal, transversal, inverse and homopolar reactance, the three-phase short circuit currents, single-phase, two-phase and shock, the time constants.