NO-LOAD CHARACTERISTICS AND AIRGAP FLUX DENSITY WAVEFORM FOR A SALIENT-POLE SYNCHRONOUS GENERATOR USING FINITE ELEMENTS

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ABSTRACT
This paper presents a finite element method (FEM) for the prediction of the no-load characteristics and airgap flux density waveform of a salient-pole synchronous generator. The described method takes into account saturation effects. The method calculates first the flux distribution in the machine and then includes them in the calculation of the no-load voltage. A magnetostatic 2-D (two dimension) finite element method magnetics (FEMM) software was used for calculating the equipotential flux lines, which resulted in a precise prediction of the no-load characteristics of the machine. The method was verified on a 4-pole, salient-pole, three-phase synchronous generator with the ratings: 5KVA, 415V, 50Hz, 1500rpm, power factor of 0.9 and the full-load field current of 0.6A, by comparing the no-load characteristics obtained by FEM to the measured no-load characteristics of the generator. FEM results were found to be consistent with the experimental results.