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The loss of self-excitation capability in stand-Alone synchronous reluctance generators

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Abstract:

The paper analyzes the capability of synchronous reluctance generators to achieve successful self-excitation when operating in stand-Alone systems. To initiate the self-excitation process, the machine steel core has to retain sufficient residual flux during the generator start-up. This residual flux depends on the magnetic properties of the machine core as well as the previous machine operating condition. A hysteresis model is developed to simulate the flux linkage-current characteristics of the synchronous reluctance generator for different operating conditions. The model then calculates the machine residual flux linkage after each operation, which indicates the machine capability for self-excitation during the next start-up. The simulation results show that the rotor steel core of the synchronous reluctance machine can be demagnetized when the generator is subjected to a short circuit condition. These simulation results are also validated by experimental measurements on a 5hp synchronous reluctance machine.

Reference:

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