

MODELING TRANSFORMERS IN MATLAB-SIMULINK

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EXTENDED ABSTRACT

Continuous development of appropriate software packages makes simulation of power engineering problems more and more effective. In this work is presented the implementation of saturable transformer in SimPowerSystems, who operates in the Matlab-Simulink environment.

The real-world components are mathematically modeled using linear and nonlinear algebraic and differential equations. The efficiency and speed of the analysis/simulation tool depends on the software modeling and program implementation of the mathematical model. The software model should be suitable for different application programs in the concerned area.

The Saturable Transformer block model consists of three coupled windings wound on the same core [4]. The model takes into account the winding resistances (R_1 , R_2 , R_3) and the leakage inductances (L_1 , L_2 , L_3) as well as the magnetizing characteristics of the core, which is modeled by a resistance R_m simulating the core active losses and a saturable inductance L_{sat} . There are two options for the modeling of the nonlinear flux-current characteristic:

- model saturation without hysteresis; the total iron losses (eddy current + hysteresis) are modeled by a linear resistance, R_m .
- model hysteresis and saturation; specification of the hysteresis is done by means of the Hysteresis Design Tool of the Powergui block. The eddy current losses in the core are modeled by a linear resistance, R_m .

Simulation of hysteresis in a Saturable Transformer block

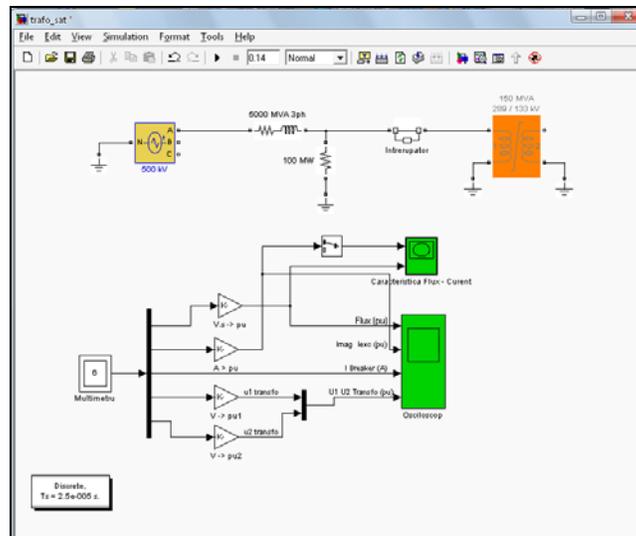


Figure 1 Simulation of hysteresis in a Saturable Transformer block

Modeling the hysteresis requires additional computation load and therefore slows down the simulation. The hysteresis model should be reserved for specific applications where this phenomenon is important.

References

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