Switched Reluctance Machines (SRMs) are gaining more attention due to their simple, and rugged construction, low manufacturing cost, and high-speed operation capability. An electromagnetic model of the machine is needed in the design, and analysis processes. The required accuracy level of the model depends mainly on the application. A high-fidelity model is required to achieve a good design, and predict the performance accurately. However, it requires high computational cost, and longer simulation time. Other fast, and less-comprehensive models with less computational burden could be utilized in the design, and analysis of the motor drives. This paper extensively analyzes various electromagnetic modeling techniques of SRMs. Analytical, numerical, and hybrid models are considered. The paper investigates analytical models that are based on Maxwell's equations in addition to interpolation, and curve fitting techniques. Numerical techniques such as Finite Element Method (FEM), and Boundary Element Method (BEM) are presented. Moreover, Magnetic Equivalent Circuit (MEC) method is discussed. Finally, potential research areas are proposed for the electromagnetic modeling of SRMs.