

Abstract

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Single Phase separately excited AC generator

Generation of AC electrical energy plays a great role in modern century. Synchronous generators occupy the interest of most research work as they present the most common generators in the power stations. Self-excited induction generators are suitable for wind energy conversion where the wind speed continuously changes such that the variable voltage-variable frequency power is converted to constant voltage-constant frequency power using power electronics. Application of both separately excited and self-excited DC generators is limited because the development of the power electronics converter which converts from AC to variable and fixed DC voltage. In this paper, the conventional separately excited DC generator is fed by a sinusoidal field current and as a result the output armature voltage is sinusoidal whose frequency equals the frequency of the field current while the magnitude depends on the speed and magnitude of the field current. The basic idea is explained. The equivalent circuit of the machine is presented and the dynamic model is simulated using MATLAB-SIMULINK software. The steady state and transient performance of the machine is concluded. The experimental and theoretical results are compared and showed satisfactory matching.