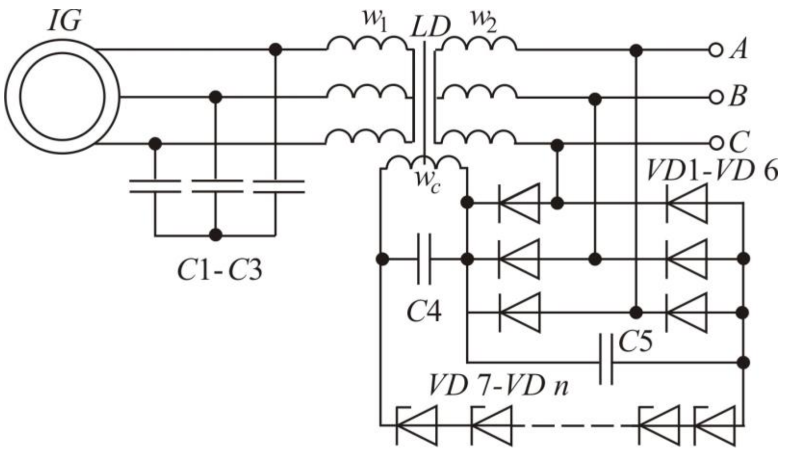
VOLTAGE STABILIZATION OF INDUCTION GENERATORS

Markov V.S.
National Technical University "Kharkov Polytechnic Institute", Kharkov



For wide using induction generators (*IG*) in isolated power plants it is necessary means of voltage and frequency stabilization. One of the possible circuits for solving such problem is presented on the figure.

There are compensating devices augmenting reactive power of capacitors as *IG* load step-up. At no-load of *IG* the control current I_{0max} flows through the control winding w_c of the choke-transformer *LD* determined by a point at a silicon Zener diode volt-ampere characteristic. The choke-transformer reactance has minimal value and maximal value current flows through its the primary winding w_1 according to the reactive power maximal value required by the transformer, accumulated energy in the bank of capacitors *C*1-*C*3. No load voltage is determined by a silicon Zener diode volt-ampere characteristic and adjusted by capacitor *C*5 capacitance selection. At load step up the voltage on the secondary winding terminals w_2 of the choke-transformer diminishes that leads to reduce a bias current of the choke-transformer determined by a silicon Zener diode volt-ampere characteristic. Bias current step-down increases the windings w_1 reactance, and leads to diminish absorbed power by the choke-transformer.

Reactive power of capacitors redistributes between *IG* and load, maintaining voltage in a particular range. The proposed voltage control system of *IG* is adapting. Total balance of reactive power of an isolated system remains constant not depending of the value and character of load. The total power of the bank of capacitors

$$Q_C = 3U_0 I_\mu (1+b) + P\text{tg}\varphi,$$

where U_0 is the no load voltage of *IG*;

I_μ is the bias current of *IG*; tgφ is load coefficient;

b = 0,4 – 0,5 is the coefficient taking into account the *IG* magnetic flux.

Derivation of voltage on the source terminals causes changing stabilization current of a silicon Zener diode from the no load value to the rated load value. The bigger resistance of the control windings the bigger value of the no load voltage of the source so that provides the rated voltage value at full load. Volt-ampere characteristics of a silicon Zener diode and resistance of the control windings adding determine a control error.

Literature:

1. Bogatyrev N.I. Shemy statornykh obmotok, parametry i kharakteristiki elektricheskikh mashin peremennogo toka. – Krasnodar, 2007. – 301.