UDC 537.3

S. SKLIAR*, *G. ZHEMEROV, Dr.Sci.Tech, Prof

Energy Conversion Systems in Windpower Engineering

Contemporary wind power is one of the rapidly developing sectors of renewable energy, it based on transformation of wind energy into a useful form of energy. Wind power, as an alternative to fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation and uses little land. The effects on the environment are generally less problematic than those from other power sources.

Nowadays wind power farms located in offshore and onshore. Offshore wind is steadier and stronger than on land, and offshore farms have less visual impact, but construction and maintenance costs are considerably higher [1].

By the end of 2013 global installed wind power generation capacity reaches 318 GW [2].

For effective conversion of wind energy into electrical power applied conversion systems. The typical energy conversion systems consist of a turbine rotor, a gearbox, a generator, power electronic converter, power transformer, and grid connection.

Particular interest is the generator and power electronics unit. The generator converts the mechanical power, which being fed into a grid possibly through power electronic converters, and transformer with circuit breakers and electricity meters. The two most common types of electrical machines used in wind turbines are induction generators and synchronous generators. Power converter is the interface between the generator and the grid. Power electronic converters are constructed by semiconductor devices, driving, protection, and frequency conversion and control. A converter, depending on the topology and application, may allow both direction of power flow. There two different types of converter system: grid commutated and self-commutated convert system. The grid commutated converters are mainly thyristor converters with high power capacity of 6 or 12 or even more pulses [3, 4].

References:

1. Fthenakis, V.; Kim, H. C. (2009). "Land use and electricity generation: A life-cycle analysis". *Renewable and Sustainable Energy Reviews* **13** (6–7): 1465.

2. Report of the World Wind Energy Association in 2013

3. M.P. Kazmierkowski, R. Krishnan, and F. Blaabjerg, Control in Power Electronics – Selected Problems. London, U.K.: Academic, 2002.

4. Z. Chen and E. Snooper, “Voltage source inverters for high-power, variable-voltage dc power sources,” Proc. Inst. Electr. Eng. Generation, Transmiss. Distrib., vol. 148, no 5, pp. 439-447, Sep. 2001