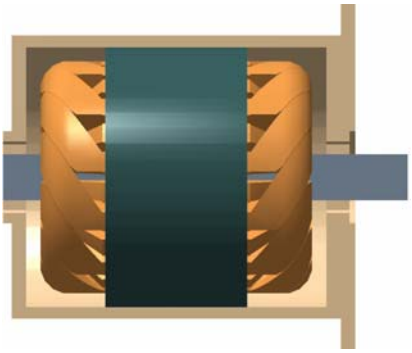
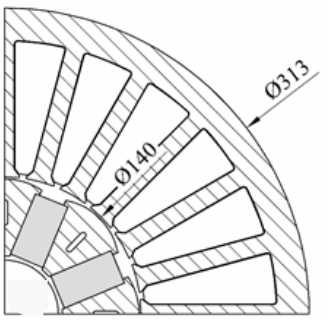
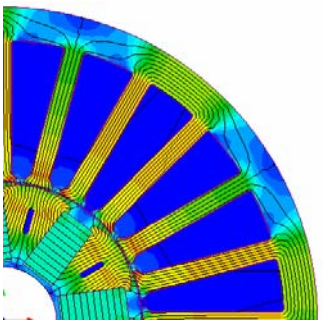
2.13. ELECTRIC DRIVE FOR VEHICLES

2.13.1. ELECTRIC MOTOR FOR CITY BUSES

An electric motor with constant magnets for medium-sized city buses is offered.







Main technical specifications:

- capacity – 168 kW (at rotation frequency n = 2300 rpm);
- torque – 696 Nm (at n = 1200 ... 1700 rpm).

Advantages

An application of electric drive instead of a diesel motor in a city bus allows to increase passengers comfort by reducing a noise inside the vehicle. In addition, the absence of harmful emissions, ease of maintenance, and low operating costs make electric buses one of the most popular type of passenger transport nowadays.

2.13.2. HYBRID ELECTRIC DRIVE FOR AGRICULTURAL MACHINES

A hybrid electric drive is intended for the use in agricultural machines, primarily in tractors in order to solve the problems of rational energy use during fieldwork. Today and in the nearest future, the most effective solution for saving fuel and reducing the level of harmful substances' emission is the use of a combined (hybrid) power supply system for agricultural machines.

A sequential kinematic diagram of a hybrid power plant eliminates mechanical connection of wheels with an internal combustion engine. The engine is a source of energy for generator, which in its turn powers electric drive of the wheel drive. A power storage device (storage battery or ultracapacitors) is located between generator and electric motor.

Main technical specifications:

Parameter at J = 10 А/мм^2	Electric generator	Electric drive
Capacity, kW at 2200 rpm	45	43
Torque, Nm at 1200-1700 rpm	-	195

Advantages

The use of electric drive allows to:

- provide stepless speed control of the tractor;
- reduce dynamic loads on the nodes of the tractor and internal combustion engine;
- reduce wheel slipping, reduce fuel consumption by up to 30%;
- ensure high efficiency in the whole range of speeds;
- keep the tractor on rise and descent, increase reliability of the tractor as a whole;

Sequential kinematic diagram of a hybrid power plant

- reduce operating costs for maintenance and repair.

2.13.3 HYBRID ENERGY INSTALLATION FOR OFF-ROAD VEHICLE

The use of a hybrid propulsion system on a vehicle allows:

- to provide heat and noise reduction;
- to improve the vehicle's cross-country capacity and service reliability in combat conditions;
- to reduce fuel consumption by 30% and emissions of harmful substances by 50%;
- to improve ergonomics of management;
- to reduce operating costs;
- to use hybrid system as a stand-alone power source in the field conditions.

Main technical specifications

Nnominal / maximum power of electric motor – 30/60 kW
Maximum travel speed on electric drive – 90 km/h
Intercharging run - 50 km.

Institute of Electrodynamics of the NAS of Ukraine provides:

- development of high-performance electric drives on the basis of electric motors with permanent magnets and transistor (intelligent) control system with power from 2 to 160 kW
- development of motor-wheels on the basis of electric motors with permanent magnets;
- production of prototype electric drives and their testing;
- introduction of electric drives into batch production.