Review of Motors for ElectricVehicles

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ABSTRACT: ***The need for renewable energy and the reduction of harmful emissions from internal combustion engines have led to the discovery and development of new drive systems by researchers and engineers. The production of electric cars has dramatically reduced vehicle emissions. This is not necessary, however. The solely electric vehicles in operation are 100% clean, and their implementation is of great importance as such. Therefore, these vehicles substitute internal combustion engines with electric motors in traditional cars and trucks.Therefore, in an electric vehicle, the need to drive the motor is highly effective with low weight, high power density and cheaply available on the market. A study of various electric motors with regard to their design simplicity, expense, robustness and efficiency is presented in this paper. Finally, in electric vehicles and hybrid electric vehicles, the brushless DC motor is known to be a successful and most fitting candidate for propulsion drive. Its power is, however, inadequate. A conceptual approach is also provided to strengthen its influence.***

KEYWORDS:Electric motors; EVs; Internal Combustionengines; ICEs

INTRODUCTION

The Alternating Current Motors:

This section reviews sinusoid ally PoweredElectric motors. These are further divided intoSynchronous and asynchronous motors[1].

Synchronous Motors:

Synchronous motors are motors where the shaft of the rotor is synchronized with the frequency of the Supply current. In these motors, the period of the rotor is exactly the same as that of the supply. Available synchronous motors include permanent magnet synchronous motor stepper motor and switched reluctance motor

Permanent Magnet Synchronous Motor (PMSM):

This engine is similar to the BLDC engine, but is powered by a sinusoidal signal to achieve lower ripple torque.The sinusoidal distribution of the multi-phase stator.Windings contain a density of sinusoidal flux in the air gap that is distinct from the trapezoidal flux density of the BLDC motor. This engine is distinguished by an induction motor and a brushless dc motor.On its stator, the motor has a permanent magnet rotor and winding. In addition, this motor's stator is equipped to create sinusoidal flux that resembles that of an induction motor. As there is no stator power dedicated to magnetic field output, the power density of this motor is greater than induction motors with the same ratings (Fig. 1)[2].

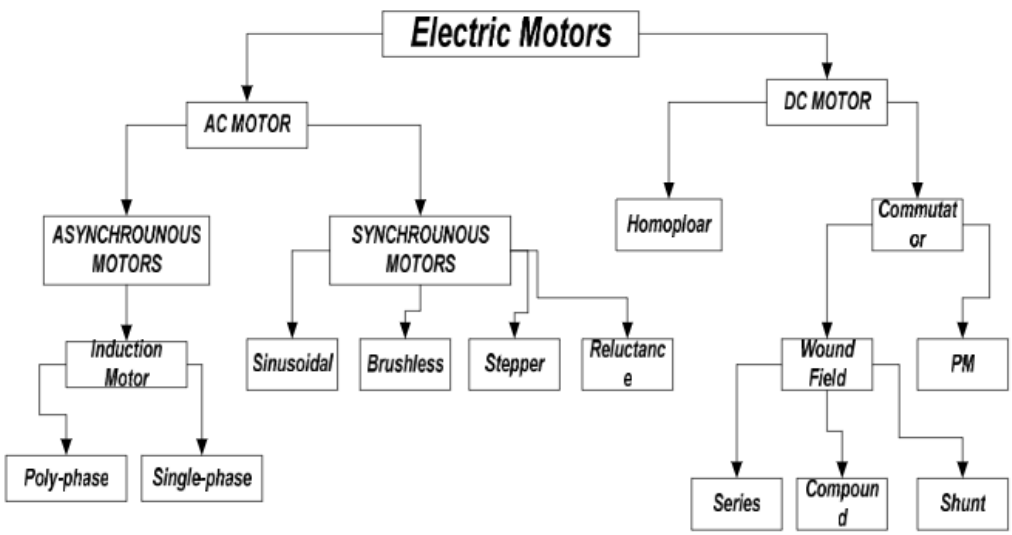

Fig. 1: Class of Electric Motor

The remainder of the paper is structured as follows; Section 2 addresses and describes various available AC motors stating their power, weakness, uses and methods of control principle. In addition, their power density, output and cost are also seen. A conceptual extended Kalman filter method for estimating the rotor location in a permanent brushless magnet motor that is still being developed is proposed and discussed in Section 3 with concluding remarks in Section 4[3].

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DirectCurrentMotors:

In this section, the different DC motors available are presented. Motors such as brushed DC and Brushless DC are presented in terms of theirrespective power density, efficiency and cost[5].

Brushed DC motor:

A brushed DC motor is made up of a commutator and brushes that transform an AC current to a DC current in an armature coil. The electromagnetic field repels the surrounding magnets with the same polarity as current flows through the armature windings and causes the wing to turn to the attracting magnets with opposite polarity[6]. The commutator reverses the current in the armature coil as the armature turns to repel the surrounding magnets, thereby allowing the motor to spin continuously. DC power can drive this motor; it is therefore very desirable for low-cost applications. However, the arcing generated by the armature coils on the brush-commutator surface generating heat, wear, and electro-magnetic interference are some drawbacks of the brushed DC motor (EMI). These characteristics of the brushed motor suggest that it is more acceptable in applications where there is no major concern about high performance. This makes this form of motor less desirable for use in EV applications (Fig. 2).

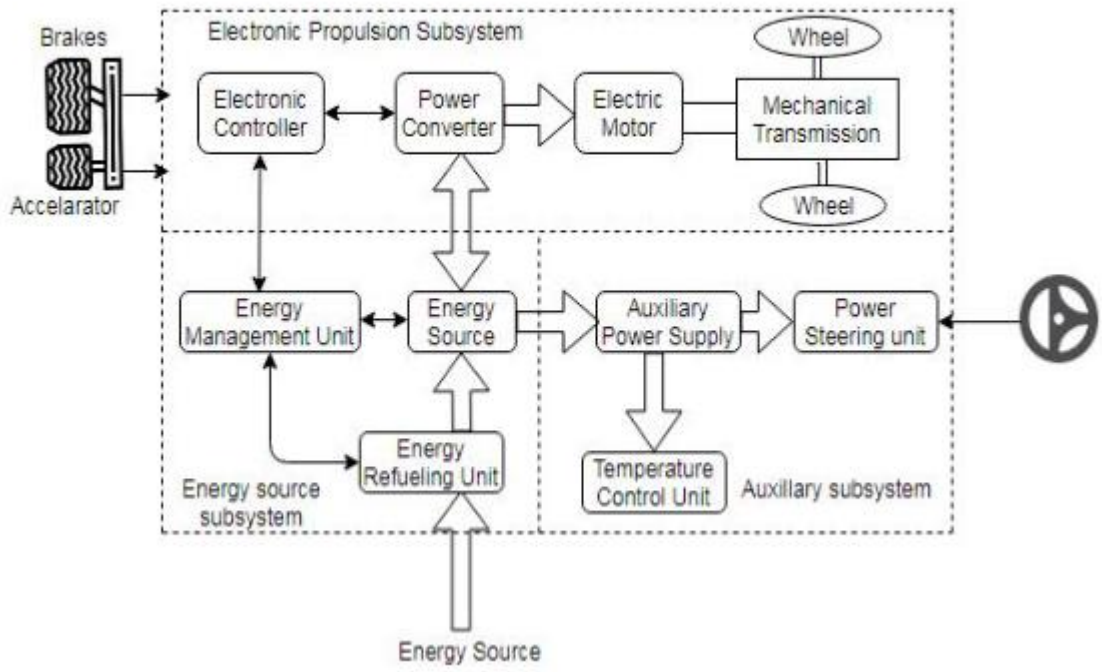

Fig. 2: Block Diagram of Electrical Vehicle

The development of electrical drives dates back to the 18 century when Faraday demonstrated the principle of electromagnetic induction Following a proposal of Faraday's law, electric motors were invented and that bred the two major classes of motors: Alternating Current and direct current motors[7]. A rotor, stator, windings, air gap, and switches/converters usually consist of an electric motor.

Centered on a different arrangement,of these components different types of electric motors are constructed. Brushless permanent magnet motors are called hose electrical motors that do not need brushes for switching or energy conversion. In addition, motors can be graded according to their back-Electromotive-Force form (Back-EMF). Their form may be either trapezoidal or sinusoidal. They may be Permanent Magnet AC Synchronous Motors (PMSM) or Brushless DC motors depending on their concepts of construction and energy exchange (BLDC)[8].

CONCLUSION

In this work, a review of different motors used as electricdrive trains ispresented. Workingthe concepts, operating criteria, excellent characteristics and disadvantages of all available engines are addressed and described in detail. The brushless DC engine has proved to be a successful candidate for electric drive train applications. This engine provides excellent power density, high performance and is available cheaply. This engine's success as an electric drive train is also seen.

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