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Lightweight High-Efficiency Power Train Propulsion with Axial-Flux Machines for Electric or Hybrid Vehicles

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Abstract

The aim of this chapter is to present a new type of powertrain with dimensions and low weight, for vehicles with reduced carbon emissions, which have an axial synchronous machine with one stator and two rotor, with static converter that is simple and inexpensive, a broadcast transmission system using an electric differential, with the control of the two rotors so that they can operate as motor/generator, at the same rotational direction or in opposite directions, at the same speed value, at slightly different speeds or at much different speeds by using an original dual vector control with operating on dual frequency. This is a major concern of hybrid and electric vehicle manufacturers. Expected results: a lighter power train with 20% and an increase in 5% of electric drive efficiency, low inertia rotor at high speed, a compact electric drive system with high torque and simple control, intelligent energy management system with a new vision of technological and innovation development, and equal importance of environment protection. The electrical



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machines for hybrid (HEV) or electric (EV) drives include a variety of different topologies. According to outcomes of literature survey, induction machines alongside synchronous machines take the major place in HEV or EV power trains.