Investigating the Algorithm to Maintain a Constant Speed in the Wankel Engine

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Abstract : Increasingly stringent emission standards for passenger cars require us to find alternative drives. The share of electric vehicles in the sale of new cars increases every year. However, their performance and, above all, range cannot be today successfully compared to those of cars with a traditional internal combustion engine. Battery recharging lasts hours, which can be hardly accepted due to the time needed to refill a fuel tank. Therefore, the ways to reduce the adverse features of cars equipped with electric motors only are searched for. One of the methods is a combination of an electric engine as a main source of power and a small internal combustion engine as an electricity generator. This type of drive enables an electric vehicle to achieve a radically increased range and low emissions of toxic substances. For several years, the leading automotive manufacturers like the Mazda and the Audi together with the best companies in the automotive industry, e.g., AVL have developed some electric drive systems capable of recharging themselves while driving, known as a range extender. An electricity generator is powered by a Wankel engine that has seemed to pass into history. This low weight and small engine with a rotating piston and a very low vibration level turned out to be an excellent source in such applications. Its operation as an energy source for a generator almost entirely eliminates its disadvantages like high fuel consumption, high emission of toxic substances, or short lifetime typical of its traditional application. The operation of the engine at a constant rotational speed enables a significant increase in its lifetime, and its small external dimensions enable us to make compact modules to drive even small urban cars like the Audi A1 or the Mazda 2. The algorithm to maintain a constant speed was investigated on the engine dynamometer with an eddy current brake and the necessary measuring apparatus. The research object was the Aixro XR50 rotary engine with the electronic power supply developed at the Lublin University of Technology. The load torque of the engine was altered during the research by means of the eddy current brake capable of giving any number of load cycles. The parameters recorded included speed and torque as well as a position of a throttle in an inlet system. Increasing and decreasing load did not significantly change engine speed, which means that control algorithm parameters are correctly selected. This work has been financed by the Polish Ministry of Science and Higher Education.

Keywords : electric vehicle, power generator, range extender, Wankel engine

Conference Title : ICAMAME 2018 : International Conference on Aerospace, Mechanical, Automotive and Materials Engineering

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Conference Location : Kyoto, Japan **Conference Dates :** April 26-27, 2018