

Dynamical analysis of the electrohydraulic valve train system

(Nyerges László Ádám 2011)

Nowadays the environmental protection is more and more important in our life, we have to take care that the industrial activity doesn't damage the Earth's ecological balance. The ecological requirements are appeared powerful in the traffic too, because the traffic is one of the biggest energy user industrial sectors.

Whether talking about the internal combustion engines, or the electrical power transmission, presently still the non renewable energy sources are used to make the kinetic energy, which the traffic needs. But our reserve of these energy sources is not limitless, and the loss-making use of the energy is waste. That's why it's very important to know: how much is the energy use's efficiency from the energy source to the kinetic energy ("well-to-wheel efficiency").

The effective efficiency of the internal combustion engines is not the biggest, but in addition they have so much advantage. Because of these, the alternative modes of the power transmissions can't replace them (for example of the advantages: the energy density of the fuel or the efficiency of the fuel production).

Probably the dominance of the internal combustion engines will remain in the next decades, and the electrical power transmission will help to increase the effective efficiency (the name of this system is hybrid power transmission). Other important development possibilities to use the bio fuels, to reduce the engine's frictional losses or optimizing the combustion and load change procedure. These new developments are for example the laminated air-fuel mixture making (Otto engines with direct injection), the turbo charger or the variable valve train/actuator systems.

The vehicular internal combustion engines works in a very wide rpm domain. Without variable valve actuator systems is not possible to realize good efficiency in every rpm (or in every throttle position).

In my research I studied one of the last variable valve train systems, the electrohydraulic valve train system. I introduce the build-up and the functioning of the system, the realizable valve openings and the advantages of these. I analyze the practical problems of the feasibility. For the dynamical analysis I used the Matlab Simulink.

At the end of my research I want to achieve that my valve opening results are able to use in an engine simulation program, to know the exact rate of the efficiency growth. With these research's results it is able to start the planning a real electrohydraulic valve train system.