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Evaluation of the dissipated energy by the automobile dampers

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The automotive industry is one of the most important sectors of the global economy, where the number of cars manufactured increase every year. Attracting the new customers, selling a larger number of models and respect the pollution standards, require the changes for all the cars subassemblies. Each subset of the car is itself a source of recovery the energy. From braking system until the aerodynamics, the car manufacturers are trying to reduce the fuel consumption, without affecting the dynamics performances. The most important directions adopted in this sense are represented by the car weight reducing, solution applied for the engine, using the modern transmission and the hybrid traction systems, optimization the aerodynamic, reducing the rolling resistance of the tires. All these improvements can reduce the fuel consumption between 2% and 40%, but with financial and intellectual efforts, until the price of the new technologies becomes accessible for the car manufactures and the customers. One of the automotive subassemblies who represent a potential continuously source of power is represented by the suspensions dampers, as long the car is in motion. The energy dissipated by the dampers suspensions can be converted into electrical energy using an electric generator instead damper or can be converted into pressure energy by using a pneumatic or hydraulic system. The parameters used to appreciate the dissipated energy are: The road profile, the car parameters, the suspension parameters and the simulation conditions. The road profile contains two components: The microstructure, which is represented by the road irregularities and the macrostructure, who is characterized by the longitudinal gradients and radius. The combination of these combinations provides 27 road profiles, characterized by the maximum speed. The car parameters contain the masses and the longitudinal position of the mass center. The suspension parameters include the masses, suspension spring rate, suspension damping, tire stiffness tire damping and the road excitation. The simulation conditions contain the length of road, cross profile, speed variation. Simulation of suspension system and evaluation of dissipated energy by the system highlights the potential of the car operation mode, where the suspension can provide a significant amount of power. A roughness road profile and a car with elastic suspension springs and stiff dampers can provide significant energy. This energy varies between 4% and 8% of the energy consumed by the engine vehicle, considering the road speed profiles below 60 km/h and a vehicle with reduced rolling resistance and drag coefficient.

Biography

Veronel-George Jacota has completed his Master's from Universitatea Politehnica din București. Since the 2014 he is the PhD at the Polytechnic University of Bucharest, in the field of Automotive Engineering, in first year, where the domain is represented by the recovery of dissipated energy by the automotive suspension dampers. For this activity he has developed an interest regarding the fuel consumption, using the innovative and sustainable technical definitions, to create the new competitive cars who complies the latest pollution requirements. His work interest is in the designing of gearbox external gearshift, at the Renault Technologies Romania.

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