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Streszczenie w języku angielskim przygotowane dla rozprawy doktorskiej zatytułowanej:

“Development of semi-active shock absorber dynamic model and parameters identification methodology”

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The shock absorber is one of the most important parts of the automotive suspension which is primarily influencing the ride and handling properties of the vehicle. Apart from this traditional low-frequency range of operation, automotive dampers can be a source of undesired high-frequency content that might lead to a range of expensive and difficult-to-solve problems, particularly when detected at the late stage of the design development project. With the growing popularity of advanced shock absorber designs, there is a demand for the ability to predict the dynamic behavior of the damper by means of computer modeling. Due to the multi-physical complexity of the shock absorber and the large number of physical characteristics involved, this task poses a significant challenge for the design teams, despite the rich scientific material and literature in that field. In order to address the aforementioned needs, the presented dissertation includes a review of the current state of the art in the field of automotive shock absorbers and methods of computer modeling of their behavior. Based on this knowledge and needs formulated during cooperation with the industrial partner engineering community, a model of the semi-active shock absorber has been proposed which is capable of reliably reproducing axial dynamics of the shock absorber up to 500 Hz by capturing various physical aspects of the valve operation and compliance of the damper as well as vibroisolators. In order to facilitate the practical application of the proposed model, a calibration procedure was necessary to estimate the values of the parameters that could not be directly obtained from the technical documentation. The first approach included parameter estimation performed at isolated test setups which required multiple experimental measurements. Despite the good quality of the model calibration, due to complex testing procedures, this approach was deemed difficult for industrial implementation. For that reason, a second approach was proposed. It relied on a much simpler experimental procedure thanks to the advanced sensitivity-based parameter estimation method. Throughout the project, the quality of the model and reliability of parameter calibration has been proven using multiple measurements performed at various assembly level.