COMPUTER MODELING OF WHEEL BRAKE SYSTEMS

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Computer modeling of kinematics and dynamic mechanical system becoming an important part of modern approach to design of technical object. The aim is authentically describe state, or behavior of real technical object, with the help of physical and mathematic theory. By creating of computer model are neglected specific properties of real model, which are not substantial for solving of problem. Modeling of Multi Body System (MBS) use system of rigid bodies connected with relations. Ordinary differential equation (ODE) is used for mathematical description of dynamics and Euler methods of integration for numerical solving.

The aim of this research is enhance the efficiency of the development process. Indicated wrong braking behavior of wheel brake in testing phase may lead to further costs and critical time delays for the start-of-production. Therefore it is necessary to know kinematics and dynamic behavior of wheel brake in design phase and realize necessary modification for improvement of braking behavior as soon as possible.

The base of the model is a system of three dimensional rigid bodies. Bodies contain data, which are exported from CAD-system. Necessary deflection of rigid bodies is calculated by component part FEA and compressibility is combination of non-linear springs (Figure 1). Rigid bodies interact with another trough the interface. Interface contain define degree of freedom DOF, friction and constrains.
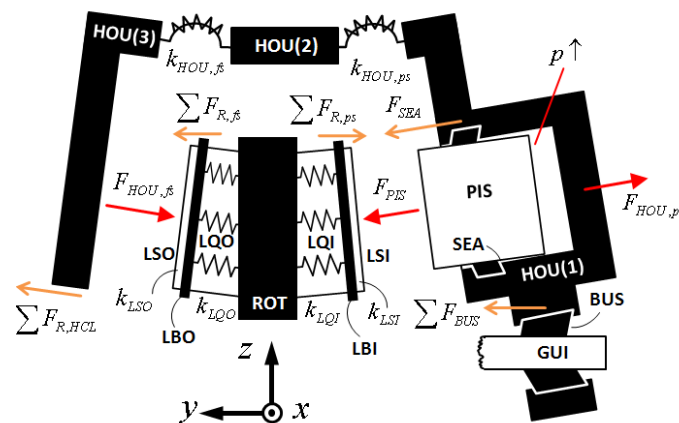

Figure 1: Physical model of the clamping process of caliper.(Haag, M., Winner, H., Ungethuem, U., Simon, D., Sykora, J., 2010: Modeling concept for dimension of wheel brake systems. Budapest, FISITA 2010 Proceeding, Fig. 4)