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Active Control of Disk Brake Sqeal

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Considerable effort is spent in the design and testing of disk brakes of modern passenger cars. This effort can be reduced if refined mathematical-mechanical models are used for studying the dynamics of these brakes before prototypes are available. The present paper is devoted to the modeling of a floating caliper disk brake, special regard being given to the suppression of squeal. The model developed includes the brake rotor, modeled as a flexible rotating plate, housing, piston, yoke, and friction pads. In this nonlinear model all the prominent features of squeal are reproduced, such as e.g. independence of the frequency on the speed, etc. In a test rig built in Darmstadt, the model is validated. In addition, the set-up also permits active control by using “smart pads”. Those pads, which include piezoceramic actuators are successfully used for the suppression of squeal.

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