

## Optimisation and Robustness of Brake Systems to Avoid NVH Problems

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**Date & Location:**

**Wednesday, 1395/10/08, at 13:30pm,**

**Iran University of Science and Technology, School of Mechanical Engineering Amphitheater**

### RESEARCH CHALLENGE:

Noise, vibration and harshness (NVH) of brakes are a major factor in car manufacturers' warranties. Recently, manufacturing variability, driver-dependent load cases and environmental effects have been considered as important factors in causing squeal noise. The solution is to assess the robustness of brakes under the effect of these variations. This study proposes a cost-effective statistical method (surrogate modelling) for assessing the robustness of brakes. On the premise of this method, robust optimisation of brake designs can also be performed.

### OBJECTIVES:

To conduct cost-effective statistical studies on brake finite element models and calculate the robustness of a brake design under the influence of manufacturing variability, driver-dependent load cases and environmental effects.

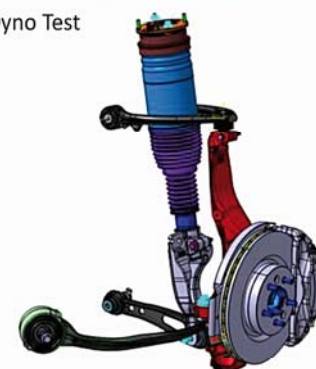
To predict optimised/robust design parameters of a corner brake assembly, which bring about a low probability of squeal noise. Several variables (controllable and uncontrollable variables) are normally included in the optimisation and robustness study. However, a 2D example is shown here for clarity.



Dyno Test



Mode shape of the unstable mode



Baseline design

### PUBLICATIONS:

- A. Nobari, H. Ouyang, P. Bannister, "Uncertainty quantification of squeal instability via surrogate modelling", Mechanical Systems and Signal Processing 60-61 (2015) 887-908.
- A. Nobari, H. Ouyang, P. Bannister, "Statistics of complex eigenvalues in friction-induced vibration", Journal of Sound and Vibration 338 (2015) 169-183.

نشانی دفتر انجمن :