



**University of Banja Luka**  
**Faculty of Mechanical Engineering**  
**Faculty of Electrical Engineering**



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## METHOD OF DISK BRAKE NOISE ASSESSMENT

Jovanka Lukić<sup>1</sup>, Jasna Glišović<sup>2</sup>, Danijela Miloradović<sup>3</sup>, Slavica Mačužić<sup>4</sup>

**Summary:** Widely used method for transient signal assessment were applied on time series of disk brake signal noise. Wavelet Transform (WT), Short Time Fourier Transform (STFT) and Continuous Wavelet Transform (CWT) were applied on time series signal of disc brake noise in order to get significant data to identify process of appearing of squeal brake noise. Various experimental conditions: pressure, speed etc were varied. Effects of different experimental conditions on disc brake noise were examined.

**Key words:** squeal brake noise, wavelet transformation, transient signal, Short Time Fourier Transform

### 1. INTRODUCTION

Brake squeal is defined as a self-excited and self-sustained unwanted noise in the audible frequency range above 1 kHz. Brake squeal is a nonlinear transient phenomenon and a number of studies using analytical and experimental models of brake systems indicate that it could be treated as a chaotic phenomenon, [4]. Data obtained from a full brake system on a noise dynamometer were examined with nonlinear analysis techniques. The application of recurrence plots reveals chaotic structures even in noisy data from the squealing events.

The Fourier transform provides the spectral content of the function, but it does not provide information on the moment when a component appears or disappears in time. Therefore it is useful for analyzing stationary functions, i.e. those that have spectral components that last infinitely.

The Fourier transform can be used to analyze non-stationary functions only when the frequency content of the function is important, while the duration of certain harmonics is not, [6].

This is the idea behind the Short Time Fourier Transform (STFT). The shorter the interval the better time and the worse frequency resolution is obtained; and vice versa, an infinite length of an interval matches a standard Fourier transform, providing a perfect frequency resolution. Segmenting the function is performed using a window

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