

## Documents

Mohd Sabri, M.A.<sup>a b</sup>, Nuawi, M.Z.<sup>a b</sup>, Tahir, M.F.B.M.<sup>a b</sup>, Abdullah, S.<sup>a b</sup>, Bahari, A.R.<sup>a</sup>, Hamzah, F.M.<sup>a</sup>  
**Monitoring system of fuel injector using piezoelectric sensors**  
(2014) *Applied Mechanics and Materials*, 471, pp. 223-228.

<sup>a</sup> Department of Mechanical and Materials Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

<sup>b</sup> Centre for Automotive Research, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia

### Abstract

The performance of a fuel injector greatly influences the performance of a vehicle engine. An effective monitoring system is capable of detecting damage, instability, and even the life of fuel injector. In this study, a test rig on fuel injector using piezoelectric film sensor has been developed. Three parameters, namely, pulse width at 5, 10, and 15 ms; frequency at 17, 20, and 25 Hz; and pressure at 10, 50, and 70 bar were used for observation. These parameters were set at different combinations to obtain the different injection patterns of the fuel injector. Statistical methods were used to analyze the data, with the aid of the Matlab software. The injection pattern was described using a new I-kaz ( $Z^\infty$ ) statistical parameter, which is intended to provide a simple explanation of the corresponding correlations between the coefficient of I-kaz and the statistical parameters, such as root mean square, Skewness, and Kurtosis, to obtain effective information on the operation state of the fuel injector. The results showed that higher pulse width results in a higher I-kaz coefficient, which also increases with an increase in frequency and varies with pressure; however, the pattern depends on the pulse width. The I-kaz scatter graph against skewness showed a clear pattern among the statistical parameters. The corresponding correlation was useful for monitoring the fuel injector and can be used as a reference for future studies. © (2014) Trans Tech Publications, Switzerland.

### Author Keywords

Fuel injector; I-kaz; Piezoelectric; Signal processing; Statistical analysis

**Document Type:** Conference Paper

**Source:** Scopus

#### About Scopus

[What is Scopus](#)  
[Content coverage](#)

#### About Elsevier

[About Elsevier](#)  
[Terms and Conditions](#)  
[Privacy Policy](#)

#### Customer Service

[Help and Contact](#)  
[Live chat](#)

