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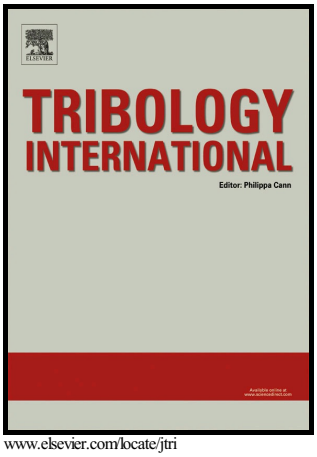

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EVALUATION OF THE BIODIESEL FUELS LUBRICITY USING VIBRATION SIGNALS AND MULTIRESOLUTION ANALYSIS

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ABSTRACT

The vibration is an important feature associated with metallic contact during operation of the injection system of diesel engines, also its analysis constitutes a tool to evaluate the lubricity indirectly. In this sense, this work uses multiresolution analysis to characterize vibration signals, improving lubricity evaluation. The experimental setup consisted of the lubricity analysis of different fuels using HFRR equipment where friction coefficient was monitored during the test as well as vibration signals. After that, Discrete Wavelet Transform generated time-scale representation of the vibration signals. This analysis provides complementary information about lubrication, in real time, and it can be associated with wear scar diameter (WSD). The results demonstrated the feasibility of this approach to evaluate fuels lubricity in a dynamic way.

Keywords: Vibration analysis, fuels lubricity, multiresolution representation, wavelet decomposition.

1. INTRODUCTION

Diesel fuels must have the lubricating ability to protect the injection system from wear and other tribological problems. However, European Union Directives have introduced the specifications of **green fuels** (Directive 2009.01) that determine the maximum sulfur content of 10 mg/kg in diesel. The process of desulfurization on diesel decreases the lubricity, causing problems related to the lubrication of the parts of the fuel injection system [1-2]. The literature suggests that the addition of biodiesel in diesel fuel is capable of restore and