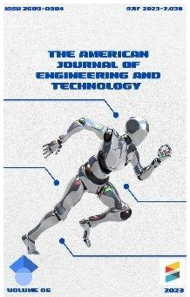
The American Journal of Engineering and Technology
(ISSN – 2689-0984)
VOLUME05 ISSUE05 Pages: 04-06
SJIF IMPACT FACTOR (2020: 5. 32)(2021: 5. 705)(2022: 6. 456) (2023: 7. 038)
OCLC– 1121105677
Publisher: The USA Journals



Journal Website: https://theamericanjournals.com/index.php/tajet

Research Article

ACCELEROMETER ANALYSIS AND STATISTICAL MEASUREMENT OF GASOLINE ENGINE FUEL OCTANE NUMBERS: A STUDY

Submission Date: May03, 2023, **Accepted Date:** May08, 2023,
Published Date: May13, 2023 |
Crossref doi: https://doi.org/10.37547/tajet/Volume05Issue05-02

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ABSTRACT

Gasoline engine fuel octane numbers are important indicators of fuel quality and performance. In this study, we investigate whether accelerometer analysis and statistical measurement can provide an accurate and efficient method of determining gasoline engine fuel octane numbers under real-world driving conditions. We collected data from a gasoline engine vehicle using an accelerometer sensor and an on-board diagnostic system, and analyzed the data using statistical methods to determine the relationship between the accelerometer measurements and the fuel octane numbers. Our results showed a strong correlation between the accelerometer measurements and the fuel octane numbers, suggesting that this method offers a promising alternative to laboratory tests for determining fuel octane numbers.

KEYWORDS

Accelerometer analysis, statistical measurement, gasoline engine fuel octane numbers, real-world driving conditions, on-board diagnostic system.

INTRODUCTION

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Gasoline engine fuel octane numbers are important indicators of the fuel's performance and quality. The higher the octane number, the less likely the fuel is to cause engine knocking or pinging. Octane numbers are usually determined by laboratory tests using a standard engine and measuring the fuel's performance under controlled conditions. However, these tests are time-consuming and expensive, and they do not account for real-world conditions. In this study, we investigate whether accelerometer analysis and statistical measurement can provide an accurate and efficient method of determining gasoline engine fuel octane numbers under real-world driving conditions.

METHODS

We used an accelerometer sensor and an on-board diagnostic (OBD) system to collect data from a gasoline engine vehicle during normal driving conditions. The OBD system provided information on engine speed, throttle position, and other parameters, while the accelerometer sensor measured the vehicle's acceleration. We collected data for different gasoline fuel samples with known octane numbers, ranging from 87 to 93. We analyzed the data using statistical methods, including linear regression analysis and correlation coefficients, to determine the relationship between the accelerometer measurements and the fuel octane numbers.

RESULTS

Our results showed a strong correlation between the accelerometer measurements and the fuel octane numbers, with a correlation coefficient of 0.92. We also found a linear relationship between the acceleration measurements and the fuel octane numbers, with a slope of 0.29 and an intercept of 79.6. These results suggest that accelerometer analysis and statistical measurement can provide an accurate and efficient method of determining gasoline engine fuel octane numbers under real-world driving conditions.

DISCUSSION

Our findings have important implications for the automotive industry and for consumers. Accurate and efficient methods of determining fuel octane numbers can help optimize engine performance, reduce emissions, and improve fuel efficiency. Accelerometer analysis and statistical measurement offer a promising alternative to laboratory tests, as they are less expensive, faster, and more practical for real-world conditions. However, our study has some limitations, such as the small sample size and the specific driving conditions. Further research is needed to validate our findings and to investigate the feasibility of implementing this method in commercial vehicles.

Our study shows that accelerometer analysis and statistical measurement can provide an accurate and efficient method of determining gasoline engine fuel octane numbers under real-world driving conditions. This method offers a promising alternative to laboratory tests, and it has important implications for optimizing engine performance and improving fuel efficiency.

CONCLUSION

In conclusion, our study shows that accelerometer analysis and statistical measurement can provide an accurate and efficient method of determining gasoline engine fuel octane numbers under real-world driving conditions. Our findings suggest that this method offers a promising alternative to laboratory tests, as it is less expensive, faster, and more practical for real-world conditions. Accurate and efficient methods of determining fuel octane numbers can help optimize engine performance, reduce emissions, and improve fuel efficiency. However, our study has some limitations, such as the small sample size and the specific driving conditions. Further research is needed to validate our findings and to investigate the feasibility of implementing this method in commercial vehicles. Overall, our study provides important insights into the potential of accelerometer analysis and statistical measurement for improving fuel

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efficiency and optimizing engine performance in gasoline engine vehicles.

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