

CHAPTER 55
TECHNOLOGY
MECHANICAL ENGINEERING

Doctoral Theses

483. ARORA (Bharat Bhushan)
Aerodynamic Studies of Diffusers (Annular Diffuser with Equivalent Cone Angle)
Supervisor : Dr. B. D. Pathak
Th 15351

Abstract

Describes experimental investigation coupled with computational modeling to explore the aerodynamics of axial annular diffuser. The facility was designed to investigate the flow behavior of annular diffusers which was capable of introducing different levels of inlet swirls. The experimentation was carried out with the help of three hole cobra probe to measure the static pressure distributions, longitudinal and swirl velocity profiles at different cross sections along the diffuser length. Computational studies were carried out with the help of CFD modeling. The validated CFD model was then used for further exploration of the detailed flow behavior of annular diffusers with various geometrical configurations for equivalent cone angle of 10° to 30° and area ratio of 2 to 4. The detailed flow behavior was studied and the diffusers performance parameters were computed.

Contents

1. Introduction. 2. Literature review. 3. Experimental setup and investigation. 4. CFD modeling. 5. Validation. 6. Result and discussion. 7. Conclusion and recommendation for future work. Bibliography and appendix.

484. NAVEEN KUMAR
Utilization of Alternate Renewable Fuels in Small Capacity Diesel Engine - Performance, Combustion and Emission Study.
Supervisors : Prof. V. K. Mahana and Prof. L. M. Das
Th 15350

Abstract

The present work generated the relevant technical information of performance, emission and combustion characteristics of the Compression Ignition engine using biodiesel and its blend with diesel fuel. As biodiesel proportion with diesel is increased up to 30% engine performance improves. However, beyond 30% substitution of biodiesel in diesel, there was no further improvement in the performance. The emission level of UBHC, CO and smoke were significantly lesser with use of biodiesel with diesel as compared to neat diesel operation. However, NO_x emission in general was found to be higher in case of biodiesel-diesel blends as compared to diesel fuel. The decrease in maximum cylinder gas pressure and ignition delay period was observed with increasing biodiesel content in biodiesel-diesel blends. The peak cylinder pressure was found to be lower for biodiesel based fuels as compared to diesel. Studies related to storage stability for one year has revealed that physico-chemical properties of both the biodiesel (rice bran oil methyl and ethyl ester) changed with the time. The rate of change of different physico-chemical properties was found to be lesser in case of both the biodiesel with an additive. The thermal efficiency showed a downward trend and brake specific energy consumption showed an upward trend with stored biodiesel and engine performance was less affected in case of biodiesel with additive. The smoke, CO and HC emission levels were found to be lesser and NOX emissions were more with stored biodiesel with the without additive as compared to fresh biodiesel. The long term endurance test and tribological studies carried out with lubricating oil suggest that wear of vital engine parts fuelled with biodiesel-diesel blend was lesser as compared to the diesel fuelled engine.

Contents

1. Introduction. 2. Literature review. 3. System development. 4. Experimental techniques and procedures. 5. Results and discussions. 6. Conclusions and scope for future work. Bibliography and Appendices.