

Reciprocating engine combustion diagnostics: in-cylinder pressure measurement and analysis

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Abstrak

This book deals with in-cylinder pressure measurement and its post-processing for combustion quality analysis of conventional and advanced reciprocating engines. It offers insight into knocking and combustion stability analysis techniques and algorithms in SI, CI, and LTC engines, and places special emphasis on the digital signal processing of in-cylinder pressure signal for online and offline applications. The text gives a detailed description on sensors for combustion measurement, data acquisition, and methods for estimation of performance and combustion parameters. The information provided in this book enhances readers basic knowledge of engine combustion diagnostics and serves as a comprehensive, ready reference for a broad audience including graduate students, course instructors, researchers, and practicing engineers in the automotive, oil and other industries concerned with internal combustion engines.

Maximizes readers understanding of the construction, working principles, installation, signal processing and limitations of the transducers used for combustion analysis;

Provides a range of different models for estimating heat release and heat transfer for combustion quality analysis;

Describes statistical and chaotic methods used for combustion stability analysis and the different knock indices and combustion noise metrics evaluated from cylinder pressure signal;

Reinforces concepts presented with end of chapter summary discussions and questions;

Explains methods used for estimation of engine parameters such as TDC, compression ratio, air-fuel ratio, residual gas fraction and wall temperature using in-cylinder pressure measurement.