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Effects of Cetane Number, Aromatic Content and 90% Distillation Temperature on HCCI Combustion of Diesel Fuels

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Introduction

IEA 2009 presentation

- Cetane number of an oil sands derived diesel fuel was increased by three methods:
hydroprocessing, adding
cetane improver, and blending with high cetane renewable diesel fuel
- Results: fuels with similar cetane number have difference performance if upgraded by different methods

Power

EGR=59.6% ± 1.5%

Introduction

- The research continues to investigate fuel property effect on HCCI combustion
- Conventional fuel quality indicators of octane number and cetane number are not enough to reasonably rate fuels for HCCI combustion
- Other fuel properties may affect HCCI combustion
 - cetane number, distillation process, aromatics content, etc.
- ***How does each of these properties affect HCCI combustion?***

Objective

- To investigate the effects of cetane number (CN), 90% distillation temperature (T90) and aromatics content on combustion and emission characteristics of a HCCI engine

Operating Conditions

Parameter	Acronym	Value
Compression ratio	CR	variable between 9.00:1 to 15.00:1
Engine speed	N	900 rpm
Manifold absolute pressure	MAP	150 kPa
Exhaust pressure	ExhP	170 kPa
Intake mixture temperature	Tmix	75 °C
Fuel vaporizer temperature	Tvap	270 °C
Exhaust gas recirculation fraction	EGR	60%
relative air/fuel ratio	λ	1.2
Coefficient of variation of IMEP	COV IMEP	$\leq 5\%$
Maximum rate of pressure rise	(dP/d θ)max	≤ 10 bar/°CA

Fuels

- To investigate the respective effects of cetane number (CN), distillation temperature (T90) and aromatics content, it is important to isolate these properties appropriately
- The Coordinating Research Council's (CRC) Fuels for Advanced Combustion Engines (FACE) Group designed a fuel matrix to enable researchers to isolate the effects of CN, 90% T90 and aromatic content on advanced combustion strategies

Acknowledgement

- Funding for this work was provided by Natural Resources Canada through the Program of Energy Research and Development (PERD/AFTER) Program, Project C22.001, and the ecoENERGY Technology Initiative, Project C21.002.

Questions?

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Thank you for your attention
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