

Table of content

Acknowledgement	1
Table of content	2
1 Introduction	3
1.1 The direct injection SI-engine	3
1.2 The turbo charged spray-guided combustion system	5
1.3 Conceptual formulation	6
2 Combustion and thermodynamics of turbo charged direct injection SI engines	7
2.1 Thermodynamic analysis of direct injection SI engines	7
2.2 Combustion of internal combustion engines	15
2.3 The spray-guided combustion process in direct injection SI engines	21
2.4 Soot formation, oxidation and emission	26
2.5 The optical determination of non-premixed flame temperature	31
2.6 Optical combustion characteristics of spray-guided stratified mixture formation	48
3 Study on combustion characteristics of turbo charged direct injection SI-engines	57
3.1 Combustion characteristics of spray-guided stratified mixture formation	57
3.2 The influence of EGR composition on engine knock	112
4 Conclusion and forecast	141
5 Nomenclature	145
6 References	151
7 Appendix	164
A Test engine specifications	164
B Test bench measurement setup	164
C Pressure indicating	168
D Vibe-Parameter	169
E Test fuel specifications	171
F Pollutant emission of internal combustion engines	172
G Exhaust gas sampling and analysis	174
H Modeling 0-D-Reactor-Network	175
I The endoscopic access	176
J The high pressure injection chamber	176
K Technical Specifications of Two-ColourRatioPyrometry (2-CRP)	178
L The optical fibre spark plug sensor	179
8 Table of Figures	180