

Contents

1 Introduction	1
1.1 Background	2
1.2 Motivation	4
1.3 Objectives	5
1.4 Methodology	6
Bibliography	9
2 Background and state of the art	15
2.1 Introduction	16
2.2 Main pollutant emissions and their formation in CI engines	17
2.3 ICE response under severe ambient conditions	22
2.4 Impact on EATS boundary conditions	28
2.5 Strategies for EATS operation improvement	34
2.6 Summary	41
Bibliography	42
3 Experimental and computational tools	65
3.1 Introduction	66
3.2 Experimental facility	67
3.3 Computational tools	77
3.4 Summary and conclusions	97
Bibliography	98
4 Diesel oxidation catalyst operation under extreme ambient conditions	105
4.1 Introduction	106
4.2 Ambient conditions effect on the DOC performance	107
4.3 Passive strategies for DOC inlet temperature enhancement	126
4.4 Summary and conclusions	157
Bibliography	160
5 DPF active regeneration optimisation in altitude based on air management	165
5.1 Introduction	166
5.2 Test campaign	167
5.3 Analysis of the experimental and modelling results	169
5.4 VGT position impact on the regeneration rate	180
5.5 Summary and conclusions	186
Bibliography	187
6 Engine and EATS synergy at low partial loads as a function of altitude	189
6.1 Introduction	190
6.2 Test campaign	191
6.3 Engine performance and exhaust temperature	193
6.4 Pollutant emissions	201
6.5 Summary and conclusions	207
Bibliography	209
7 Concluding remarks	211
7.1 Introduction	212
7.2 Main conclusions	213
7.3 Future works	219
Bibliography	223
Global bibliography	225