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Cold Start Emissions Optimisation Using an Expert Knowledge Based Calibration Methodology



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Abstract

As emissions regulations become more stringent, an efficient and effective method of rig-based transient engine calibration becomes increasingly desirable. It is known that approximately 80% of total drive-cycle exhaust emissions can be produced in the initial warm-up phase before catalyst 'light-off' is achieved and catalyst conversion efficiency increases. During this period, there is a clear trade-off that can be made in the strategy between the amount of thermal energy that is delivered to the catalyst and the amount of exhaust emissions produced during the time before catalyst 'light-off' is achieved. This paper examines whether an automated expert-knowledge based decision-making methodology can be used to find a satisfactory trade-off between these two parameters whilst reducing the iteration time and level of input required from a calibration engineer.

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Topic

- Exhaust emissions
- Environmental regulations and standards
- Catalysts
- Emissions
- Calibration

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References

1. Hunter, C. E. Gardner, T. P. Zakrajsek, C. E. 1990 Simultaneous Optimisation of Diesel Engine Parameters for Low Emissions Using Taguchi Methods SAE Paper 902075
2. Yan, J. Rogalla, R. Kramer, T. 1993 Diesel Combustion and Transient Emissions Optimisation Using Taguchi Methods SAE Paper 930600
3. Hochschwarzer, H. Kriegler, W. Schon, M. 1992 Fully Automatic Determination and Optimisation of Engine Control Characteristics SAE Paper 920255
4. Andrews, S. Cary, M. Hilton, D. 1998 The Application of Design of Experiment and Multi Variable Optimisation to Cold Starting in an Automotive SI Engine SAE Paper 981413
5. Ward, M. C. Brace, C. J. Vaughan, N. D. Shaddick, G. Ceen, R. Hale, T. Kennedy, G. 2002 Bayesian statistics in engine mapping. In: Statistics and analytical methods in automotive engineering IMechE conference transactions September 2002 3 16 Bury St Edmunds Professional Engineering Publishing
6. CP Engineering 2000 ICAM Component Manual
7. Mowll, D. Robinson, D. R. 1996 Bayesian Experimental Design and its Application to Engine Research and Development SAE Paper 961157
8. Mowll, D. Robinson, D. R. Pilley, A. D. 1997 Optimising Engine Performance and Emissions Using Bayesian Techniques SAE Paper 971612
9. Lewe, J. H. 2002 A Spotlight Search Method for Multi-Criteria Optimisation Problems 9th AAIA/ISSMO Symposium on Multidisciplinary Analysis and Optimisation Atlanta Sep. 2002
10. Marler, R. T. Arora, J. S. 2003 Survey of Multi-Objective Optimisation Methods for Engineering August 4th 2003
11. Sun J. Sivashankar, N. 1997 An Application of Optimisation Methods to the Automotive Emissions Control Problem Proceedings of the American Control Conference Albuquerque June 1997 3 1608 1612
12. Sun, J. Sivashankar, N. 1998 Issues in cold Start Emission Control for Automotive IC Engines Proceedings of the American Control Conference Philadelphia June 1998 3 1372 1376
13. Tamaki, H. Kita, H. Kobayashi, S. 1996 Multi-Objective Optimisation by Genetic Algorithms: A Review Proceedings of the IEEE Conference on Evolutionary Computation ICEC 517 522
14. Fonseca, C. M. Fleming, P. 1998 Multiobjective Optimisation and Multiple Constraint Handling with Evolutionary Algorithms - Part I: A Unified Formulation IEEE Transactions on Systems, Man and Cybernetics - Part A: Systems and Humans 28 1 26 37
15. Sano, Y. Kita, H. Kamihira, I. Yamaguchi, M. 2000 Online Optimisation of an Engine Controller by means of a Generic Algorithm using History of Search IECON Proceedings (Industrial Electronics Conference) 4 2929 2934
16. Senecal, P. K. Reitz, R. D. 2000 Simultaneous Reduction of engine Emissions and Fuel Consumption Using Genetic Algorithms and Multi-Dimensional Spray and Combustion Modeling SAE Paper 2000-01-1890
17. Subramaniam, M. N. Reitz, R. D. 2003 Reduction of Emissions and Fuel Consumption in a 2-Stroke Direct Injection Engine with Multidimensional Modeling and an Evolutionary Search Technique SAE Paper 2003-01-0544
18. Reciprocating internal combustion engines - Exhaust emission measurement - Part 1: Test-bed measurement of gaseous and particulate exhaust emissions
19. Coleman, T. Branch, M. A. Grace, A. 1999 Optimization toolbox for use with MATLAB: user's guide Natick, MA
20. Lee 1994 Bayesian Statistics, an Introduction
21. Vehicle Certification Agency 2003 New Car Fuel Consumption and Emissions Figures

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