# DIAGNOSIS AND MODELLING THE INTERNAL COMBUSTION ENGINE FOR CONTROL: REVIEW AND FUTURE TRENDS

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## ABSTRACT

*Constraints change as pollutant standards or embedded diagnosis demands require improvements in model accuracy and their suitability for control algorithm synthesis. From thermodynamic mathematical modelling to non-parametric models, a wide range of techniques has been investigated for the last thirty years involving both physicists and control engineers. The purpose of this paper is to give an overview of current modeling techniques, oriented control analysis and design for compression ignition engines. Comparison of various engine models exhibits the trend to include more physical knowledge inside model-based control design.*

## REFERENCES

[1] R. Isermann, J. Schaffnit, and S. Sinsel. Hardware-inthe-loop simulation for the design and testing of enginecontrol systems. Control Engineering Practice, (7):643– 653, 1999.
[2] P. A. Hazell and J. O. Flower. Sampled data theory applied to the modeling and control analysis of compression ignition engines - Part 2. International Journal of Control, 13(4):609–623, 1971.
[3] J. O. Flower and G. P. Windett. Dynamic measurements of a large diesel engine using p.r.b.s. technique - Part 1. Development of theory for closed loop sampled systems. International Journal of Control, 24(3):379–392, 1976.
[4] S. A. Billings, S. Chen, and R. J. Backhouse. The identification of linear and non-linear models of turbocharged automotive diesel engine. Mechanical Systems and Signal Processing, 3(2): 123–142, 1989.
[5] A. Rachid, A. Liazid, and J. C. Champoussin. Nonlinear modelling of a turbocharged diesel engine. In IEEE Conference on Control Applications, volume 1, pages 133–136, Piscataway, 1994.
[6] V. Krihnnaswami, Y. W. Kim, and G. Rizzoni. A new model order identification algorithm with application to automobile oxygen sensor modeling. In Proceedings of the American Control Conference, pages 2113–2117, Seattle, Washington, June 1995.
[7] M. Hafner, M. Schüler, and O. Nelles. Dynamical identification and control of combustion engine exhaust. In Proceedings of the American Control Conference, pages 222–226, San Diego, California, June 1999.
[8] R. Iserman and M. Hafner. Mechatronics combustion engine - from modeling to optimal control. European Journal of Control, 7(2-3):220–247, 2001.

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