

Improved Engine Control Strategies Enabled by Digital Signal-Processing Method for Zirconia Exhaust Sensors

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Poster P-1

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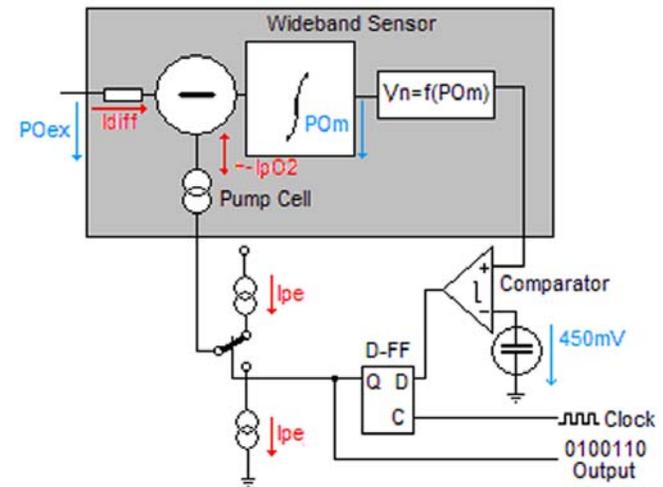
Project Summary

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This presentation describes a new approach for wideband O₂ sensor control that treats a pump-cell sensor not as a feedback controlled system, but as the “analog” front-end of a modified Delta-Sigma Analog-to-Digital Converter. This enables:

1. Automatic calibration for sensor drift compensation
2. Simplified, low-cost controller implementation
3. Cost reduced, single-cell wideband sensors
4. Detailed sensor diagnostics
5. Individual-cylinder balancing
6. Misfire detection
7. Potentially faster “light off” time and increased durability

Dynamic model:



Step response comparison:

